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Thomas A. Edison Papers

A SELECTIVE MICROFILM EDITION

PART II
(1879–1886)

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Frederick, Maryland
1987

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at
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18 June 1981

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A Note on the Sources

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THOMAS A. EDISON PAPERS

A SELECTIVE MICROFILM EDITION
PART II
(1879-1886)

REEL 42

NOTEBOOK SERIES (NBK-20)

New York Notebooks

Fort Myers Notebooks (#1 - #3)

NEW YORK NOTEBOOKS, 1884-1886

These notebooks were used at Edison's New York City laboratory, which was located above the offices of Bergmann & Company at Avenue B and 17th Street. Most of the books date from 1885, but some also include entries from 1884 and 1886. One book contains an entry from 1888. Most of the notes, drawings, and calculations are by Edison. There are also some entries by John F. Ott, Ezra T. Gilliland, H. DeCoursey Hamilton, Montgomery Waddell, and other laboratory assistants. The books deal with a wide variety of subjects, including electric lighting and power, telephony, telegraphy, mining, and the phonograph. There is also material relating to various other technologies such as artificial silk, a thermostatic regulator for heating houses, and a snow-clearing machine. Several books contain entries pertaining to Edison's search for a new force and his attempt to convert heat directly into electricity.

The notebooks appear on the microfilm in the following order:

1. N-84-05-29 (1884)
2. N-85-05-22 (1885)
3. N-85-05-28 (1885-1886)
4. N-85-10-01 (1885-1886)
5. N-85-10-03 (1885)
6. N-85-12-06 (1885-1886)
7. N-85-12-08 (1885-1886)
8. N-86-04-28 (1886)
9. N-81-09-13.1 (undated)
10. N-81-09-13.2 (undated)

New York Notebook, N-84-05-29

This notebook covers the period May-June 1884. Most of the entries are by Edison. Included are notes and drawings relating to filament experiments to be conducted by several assistants, calculations about the cost of mining operations, a list of articles in the Philosophical Transactions, and a list of scientific equipment companies and their addresses. There are also a few drawings by an unknown assistant that appear to be for a furnace and flue design. The cover is labeled "C. H. Campbell." The book contains 280 numbered pages followed by 2 unnumbered pages.

Blank pages not filmed: 216-259, 266-268, 271-274, 277.

Missing page numbers: 119-120, 123-130, 133-206, 269-270, 275-276.

No May 29/84

ARTHUR & BONNELL
MANUFACTURERS
55 CEDAR STREET
New York

N-84-05-29

Write for all Catalogues &c

R & J Beck 68 Cornhill London EC

Newton & Co 3 Fleet st London EC

John J Griffin & Sons 22 Garrick st London WC -

John Browning 63 Strand. London WC -

Negretti & Zambra
Holborn Viaduct London

Cambridge Scientific Instrument Co
Cambridge England

See page 21

N-84-05-29

Carbon Spectra Watts
Phil Mag Oct 1869 - Chem News Oct 1870

Comp R Vol LXXV p 1735-37 -
Dec CO_2 by E in Tubes -

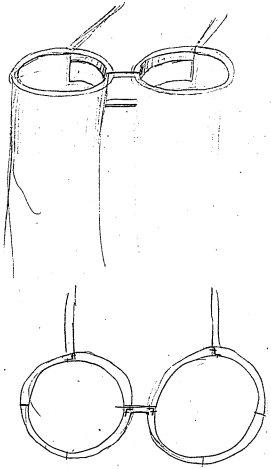
absolute Clean Hg - Quincke - Phil Mag
apl may June 1871 p 460 -

Wullner Phil Mag May 1870 p 366
also Phil Mag Vol 37 p 405 1st page

S Carbon Swan - Edinboro Phil Trans XXI.
1856 p 411

Morren Anal Dr Chem et P 1865 Vol 4 p 30
Plegg - Phil Mag 34 p 302 Vol 37 p 208
Brulle - Vol 37 p 111

June 2/84



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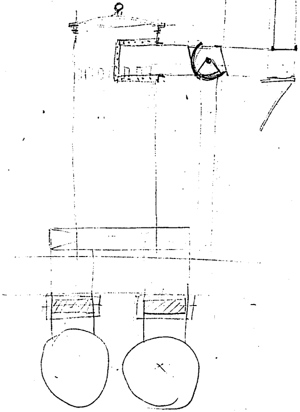

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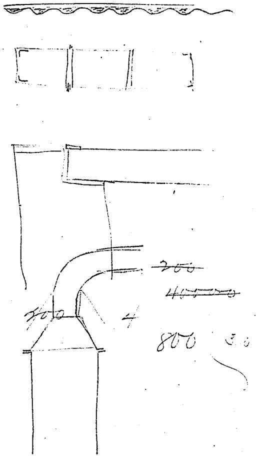

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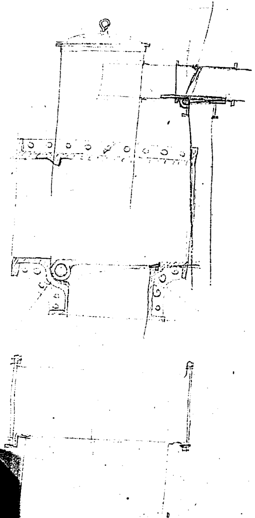

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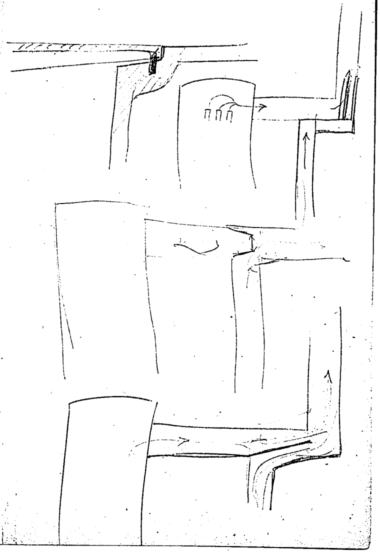

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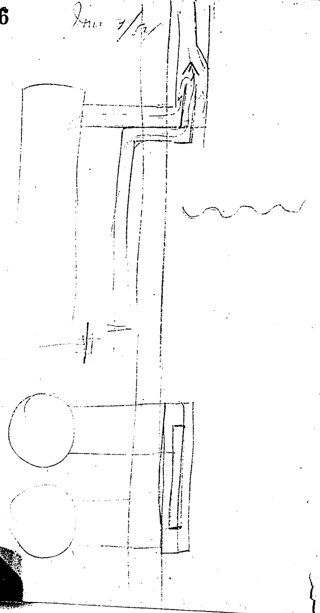

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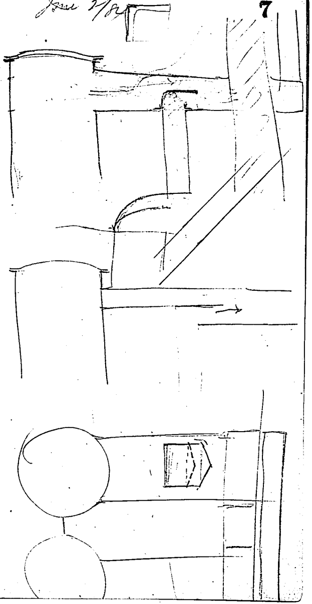
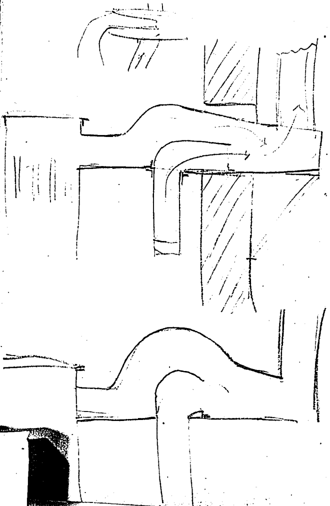


J. C2

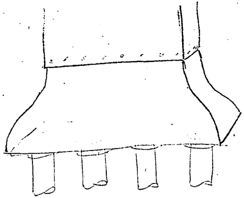


42 Each Pipes @ 6" = 42. 28,27

1190 sq inches

2 × 600 sq"

2 × 5' × ~~8.3~~ 10"   2 × 5' × 10"



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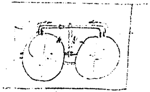

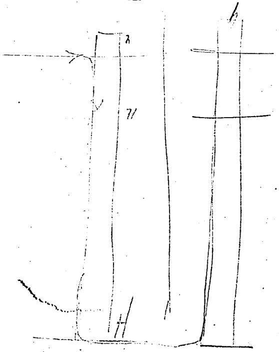

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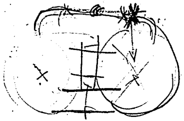

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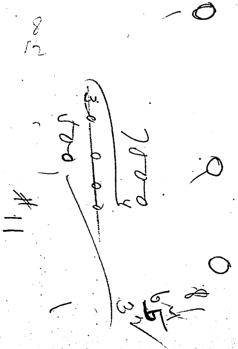

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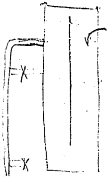
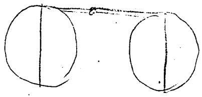
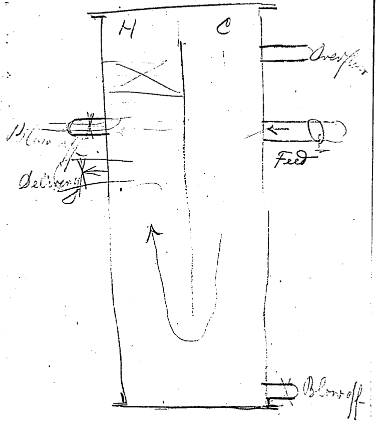
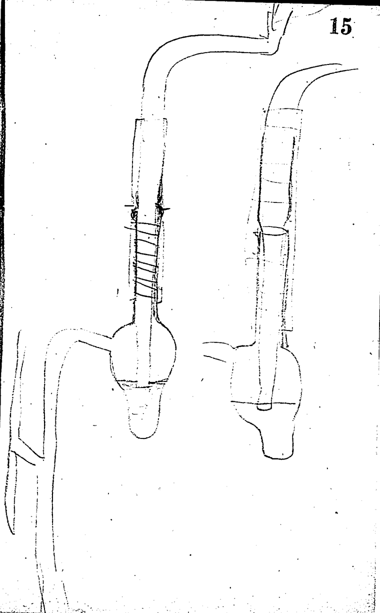






June 4



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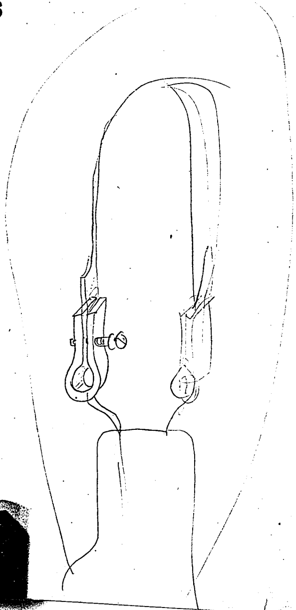

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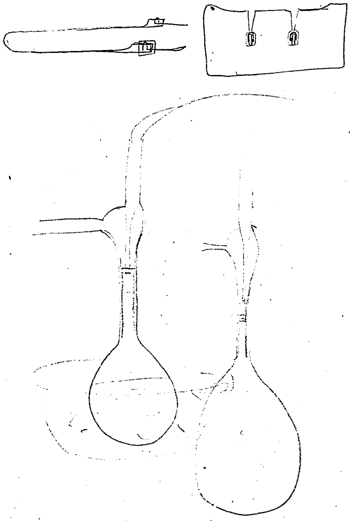
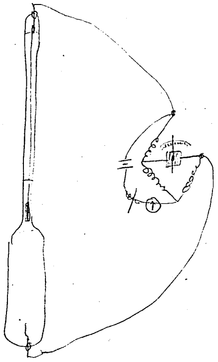
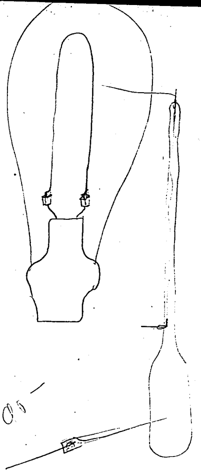






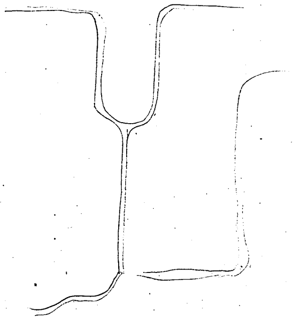
5

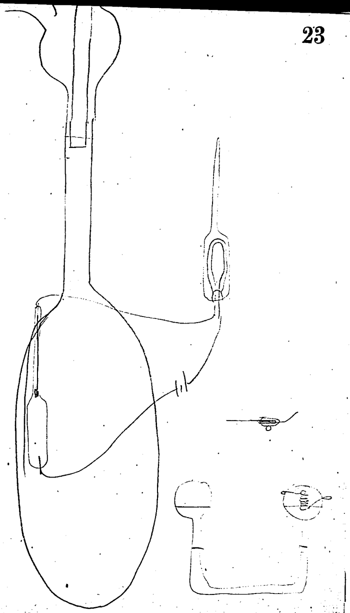
50

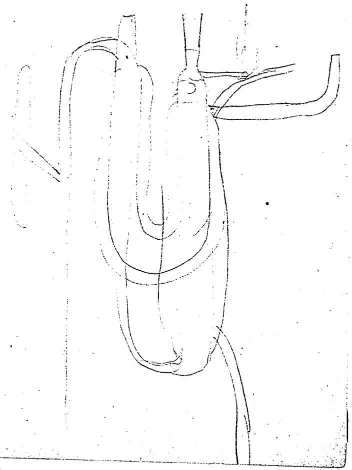
= 0.5

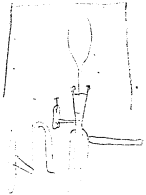
150.

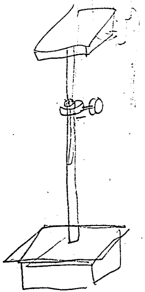
[illegible] HCl [illegible]

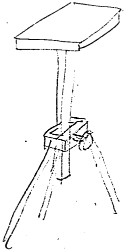












Oxygen tube

O tube
$85\frac{7}{10}$ - $\frac{1}{3}$ the width of the H. Line -
$92\frac{7}{10}$ - Quite a strong line
$115\frac{2}{10}$ -
$119\frac{6}{10}$ -

Oxygen tube in addition to Hydrogen there are carbonic acid -

CO_2 Spectrum stronger than O Not sure that these are O lines -

The following Experiments are to be tried by you please keep an accurate record of exactly how you try each Experiment so that it may be duplicated if the results are found to be valuable -

Experiment Payne NO 1

Take an evaporating dish ~~fill~~ say 6 inch diameter + deep - put in 20 ~~Regular~~ 16 CP + 20 10 CP carbons fill half full with strong Sulphuric acid put dish in iron ring of retort stand and put heat direct on dish = ? wish to boil the sulphuric acid - you will have to do this in forge or outdoors or place where the vapor of Sulphuric acid will go off as it is very irritating great quantities come off & without good ventilation you cannot get near the dish when boiling - you will find that the Carbons will bend in every conceivable shape in the most extra ordinary manner this does not take place until the acid boils - after they have bent. allow dish to cool then take Carbons out wash well in Water & allow them to dry then deliver to me I want to examine them under the Microscope

Experiment Payne No2

Take 10 forms which have 3 Reg
A Carbons in them ~~that~~ have
been preliminarized and not
fully Carbonized - secure these in
a plumbago crucible so they
will not float in the liquid
but will remain in their
position in the forms and at the
same time be free to contract
& pull up the weights
fill the mould full of Tin cut in
small pieces so ~~that~~ when
melted 2 or 3 inches of liquid
tin will remain above the
filaments, give this mould to
Lawson & have him run it
through his furnace - afterwards

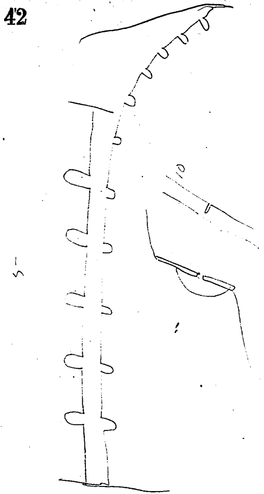
~~[illegible]~~ Have him inform
you when he is ready to take
it out of the furnace, you
must be there, and wait until
the Crucible as fallen below a
red heat, & just before the
Tin Solidifies pour it out.
+ takes forms out, Tin Solidifies
at 222 Centigrade I think
if any tin adheres to Carbons
Eat off with warm ~~[illegible]~~
Hydrocloric acid. then wash
Carbons well with water
dry and put in paper box
making a box & also a slip
inside Payne Experiment
No 2 - you should keep

record of every circumstance connected with putting them in & how they appeared on coming out no put in & no ~~taken~~ broken etc —

deliver box to me —

Payne Experiment No 3.

Take ~~the~~ gas tube 1½ diameter inside put in 2 forms containing 3 bamboo filaments in each form. fill the tube full of powdered asphalt. Screw on the End & put the whole thing in a sand bath & bring it up gradually to 600 degrees Fahr in 6 Hours after that take it down to the forge and gradually bring it to bright yellow or whitish heat in say one hour - then cool it & cautiously unscrew the cap to allow the gases to escape gradually & get the forms out the best you can ~~pa~~ perhaps you will have to take the forms out & take cap off before the asphalt has been cooled & hardened otherwise it might either break the carbon by contracting while solid or you couldn't dissolve it out in a week - I think the best way perhaps would be never to allow it to solidify after you have started but to



Keep it always liquid
+ then pour it out, or if this
didnt work well to heat
some Linseed oil up to
4 or 500 Fahr + while Asphalt
was liquid in The iron tube
take Cap off + put tube in
hot Linseed this would
mix + make it limpid so
you could get forms out,
If you succeed, take The
filaments, soak them in large
quantity ~~turpentine~~ slightly
warmed) + then dry—
replace each in a Seperate
form give them Each payne
No 3 + deliver to Lawson

to be run through the final
Carbonization, not the preliminary
& then they are to be redelivered
to you put them in paper
box & deliver to me —

If this Experiment succeeds
well I want to make variations
by using a slightly larger tube
so 4 or 5 forms can be put in
& The use of Wood Tar — also
I desire to run the temperature
up with various degrees of
rapidity — & using various
~~[illegible]~~ materials in tubes —

~~Payne No 4~~

Edison No 1

Take 10 Reg Carbons mounted on inside parts. dip in Sugar solution – & have Payne pass current through them while immersed in Kerosene oil – Seal in Lamps get Cur

Edison No 2 – Have 10 Reg Carbons mounted on inside parts then dipped in Sugar sealed in lamps & worked by Edison pump.

Smallbook

Payne No 4 -

get a large Hessian Crucible,
place in it tin & get it at White
heat, ~~[illegible]~~ in forge or
otherwise, then devise a
dipping tool holding say
6 forms arranged so they
can be dipped in the ~~meta~~
Molten Metal & hold there
for any required ~~length of time~~
The forms should be arranged
so filaments will not float
out & also allow them to Contract
in the usual way - if forms are
inadmissible arrange the
filaments so they will retain

their shape - use bamboo filaments - allow the filaments to stay in bath long enough to ~~[illegible]~~ allow liquid to come in ~~Contact~~ + fully

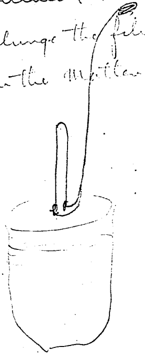
Carbonize them - in using our regular forms it is probable that the molten metal will not touch all parts of the filament simultaneously if not they will be unevenly Carbonized - try and avoid this if possible -

~~Heat~~ be sure and have the metal up to a vivid white as I want to Carbonize them fully in this operation +

not be compelled to have
Lawson run them through—
if the metal is not vivid
white the resistance of the
Carbon will be too great
& work badly on pumps—
Run through an order of
20 filaments & deliver to
me marked Payne No 4.

~~a Variation~~ if you find trouble
with tin in getting to a
white ~~heat~~ try Copper—
Lead, etc—

a variation I want you to try
is to take a filament ~~in a~~
and arrange an iron plunger
securing the broadened Ends
of the filament to the plunger
& then plunge the filament
down in the Molten liquid
Thus



This will Keep the filament
straight + cause it to be
carbonized progressively
~~But~~ If this works run through
20 plunging them in
instantly - Mark this
Payne Variation No 1 Experiment
No 5 —
also dip 20 slowly taking say
1/2 minute before the top of the
filament is covered —.
Mark this Variation No 2. Payne Experiment
No 5.— It may be that in
doing it slowly filament will
oxidize

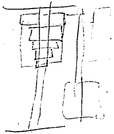
Edison No 3 —

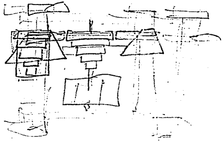
Carbonize bamboo filaments
in warm sulphuric acid but do it
very very slowly - break some & see
how far in it Carbonizes see if can
get it fully carbonized — then wash
a dozen thoroughly put in forms
& run through reg process —
also dozen dipped in sugar &
run through full process &
set up at 80 cp

Small fork

~~Marshall~~ - Martin

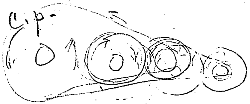
~~Pass~~ ~~Take~~ a Have Holzer.
take 15 Regular A Lamps break
Vacuum take out carbons - then
you dip them in Sugar put
them in forms & have them
run through the regular full
process, give them order number
& have them run through
regular way (i.e. Copper plate)
Clamps etc - & set up at
80 cp -

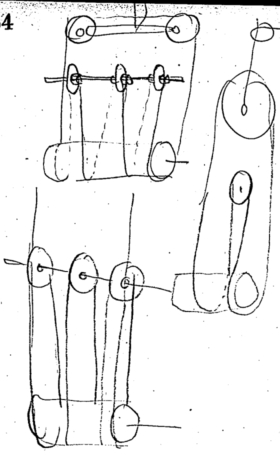




Martin-

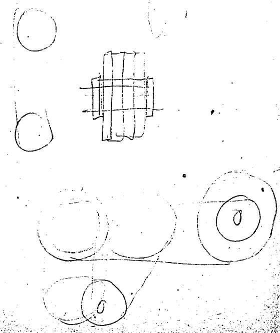
Have Holzer take 20 Regular A lamps set them up at 90 candles burn them for ~~ex~~ two hours then take those that remain unbroken & take out carbons & deliver them to you you dip them in Sugar Solution & run them through full factory process — & have them set up at 80

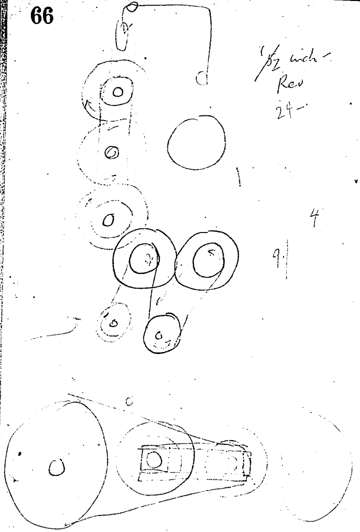




Howell -

Take several Curves of ~~Rego~~ Regulars at 80 candles & plot a Curve of drop in Candle power.

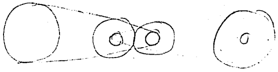


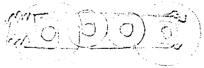


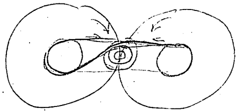
Hamilton -

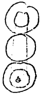
Additional Experiments
with tubes -
In this Case the tubes are to
have their tip broken off before
heating so that there will
be no pressure in them on heating
only those substances are to
be used which do not boil
below 500 Fahr

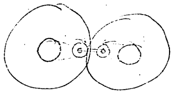
Such substances will be
Linseed oil - Mercury
Carbolic acid - Wood tar
Rosin - Glycerine - Asphalt
Rosin & Flour Sulphur
fusible metal
Anthracene





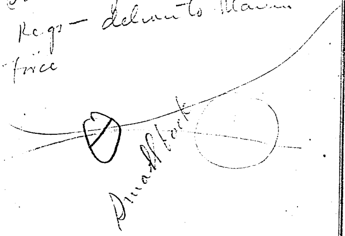


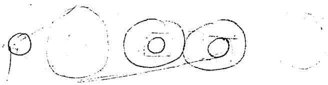




Mills -

Cut some Reg A Carbons from Bristol board 8/1000 thick say ~~[illegible]~~ 100 - 13½ 6½ inch which I believe is length & width of Regulars if not make them same length ~~&~~ width as Regs — deliver to Martin Force





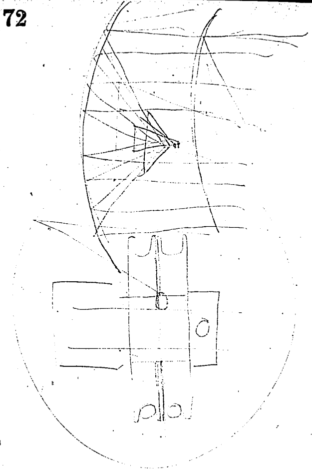
210 —

30 —

93
3
279.

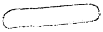
Martin —

Mills will deliver some 100 paper carbons & some thick & same length & width as regulars — put 75 of these in regular forms & have them preliminaryzed then dip in Sugar & have them run through the regular factory process & set up at 80 c.p.



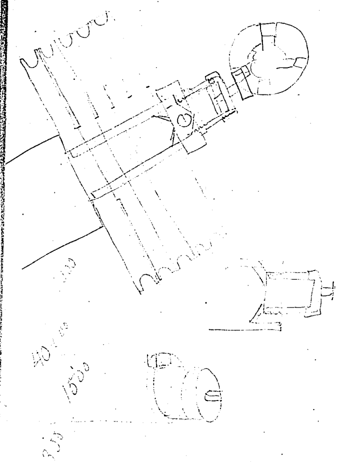
Johnoll.

Make a drawing die to
draw 6 X 10 filament. of steel
& if it works well [illegible] have a [illegible]
diamond one made the Edge
can be sharp but it is safer
than slightly rounded [illegible]



Perhaps you can draw them
round & then run them through
a flattener drawing knife a die.

Small bore



Martin -

Put in your preliminary furnace in a box of metal about 35 forms with single Reg

A Carbon in & get oven hot & then run them to 600 as fast as possible & hold them there for 1/2 hour

Another run to 800 fast as possible & hold 1/2 hour -

~~Both those~~ [illegible] 15 -

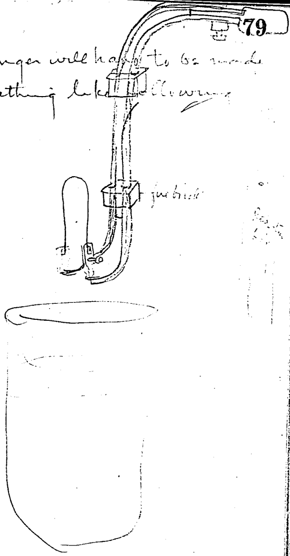
Carbons from each are to be run through Lawsons final only & the other 15 of each is to be dipped in sugar & run through full process.

process + set up at 80 cp -

Payne

Take a Hessian Crucible
+ prepare a plunger that will
hold ~~a [illegible]~~
a carbon in platinum clamps
which are connected to the iron rods [illegible]
~~have pl[illegible]~~ which extend
from each clamp upwards to
handle so the Rods can be
Connected to the Current.
The whole is to be dipped in
the Molten Solution & the
Current put on & the Carbon
brought up as high as
possible, ~~the [illegible]~~ the

plunger will have to be made
something like following



The materials to be put in Crucible each experiment are as follows - are Curve of 15 are to be prepared from each solution that will not attack the Crucible ~~15 [illegible]~~ ~~[illegible]~~ ~~are to be dropped in~~

Chloride of Calcium
Trifluoride Antimony melts 292 C
Chloride aluminum boils 180 C
Chloride Cadmium
Mercuric Chloride - $HgCl_2$
Iodine Monochloride melts 75 Fahr probably liquid ordinary [illegible] ICl - boils 213 Fahr This will be an Excellent solution -
Trichloride just as good -

Hamilton to add to Sealed tube Expts. No 29 Iodine Monochloride or Trichloride — liquid at 75 Fahr Boils 213 Fahr.

No 30 perchloride phosphorus melts under pressure at 298 Fahr + boils about same point —

No 31 amorphous phosphorus boils at 511 C. under pressure of 400 [illegible] in sealed tube —

No 32 Iodine in tube melts 220 Fahr —

26
130
13
2600

Sulphur Monochloride — Boils at 280 Fahr —

Trichloride Antimony melts 161 Fahr boils 420.

Bromide aluminum melts 194 boils 518 Fahr.

amorphous phosphorus —

In using the aluminum salts look out [illegible] between the [illegible] + the salt for the formation of metallic aluminum perhaps the metal can be formed in this manner very cheaply

Mercuric fluoride - Melts.
266 Fahr - decomposes above
that point this would be good
salt to use.

Trifluoride Arsenic boils at
147 - [illegible]
[illegible]

Martin.

Get some [illegible]

cotton [illegible] [illegible]

+ 10/1100 [illegible]

without [illegible] box [illegible]

in proper shape [illegible]

box + 4 boxes [illegible]

through [illegible] [illegible]

then [illegible] [illegible]

+ then run them through

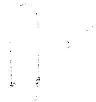
full factory [illegible] select 10

good ones [illegible] the

clamps + get a [illegible] ~~[illegible]~~ their

5th time

Candle power when set up
at 160 candles per hp
~~[illegible]~~ Then [illegible]
the [illegible]
2 inches long [illegible]



If they [illegible] [illegible] say 11
candles at 160 candles [illegible]
per hp power [illegible]
Then [illegible] [illegible]
or 5 times [illegible] [illegible]
power at 16 c.p. hp.

UUU

Payne—

In a Hessian Crucible place
several Regular forms with 3
bamboo Reg. A filaments. Secure
them so they will not float
out & also arrange so they will
draw the weight up as now—
pour. Mercury in so it just
covers the forms, over this
place Scraps of Tin which
when melted would more
than cover the forms if no
mercury was there, then
put in chamber and gradually
during 3 hours bring crucible
up to 600 deg fahr—
then take it to forge and
bring it up to a vivid white
heat. The ~~mercury~~ tin will

melt before the mercury
volatilizes + after 650 the
mercury will volatilize
but the tin will remain.
Thus you will have the
filaments in ~~Contact~~ with a
Liquid metal from the
temperature. ~~of~~ the atmospheric
way up to a white heat.
then allow the tin to cool
down below red heat +
pour it off + get Carbons
out, If they come out good
Run another lot through.
place Each lot in ~~box~~
paper box + hand to me
with your number on it.

Edison –

Put 10 Regs up at 80 candles until 4 have busted – take remainder down break Vac & take Carbons out & put in paper box to be examined Carefully under Microscope –

Ø

Small

~~Hamilton~~

Lawson - Smallbook ✓

Take some regular A Carbons
A ~~that~~ have had high final
heat and put them under
same conditions as to
preliminarizing that you did
when you got those cracked
Carbons if I remember right
you simply took bamboo
& put them through the
preliminary process 3 times
successively without final
now what I desire to
ascertain is will it crack
Carbons already fully
Carbonized - I think
you better duplicate

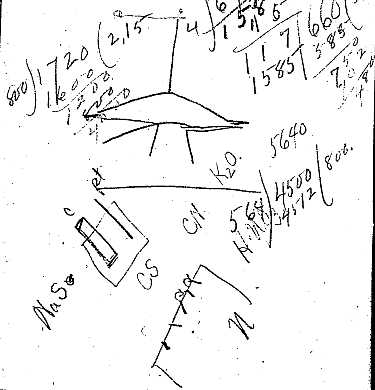
Your old Experiment of preliminary
some Reg A filaments 3
times successively - 1/2 of
them if not Cracked Keep &
the other 1/2 run through to
regular final I want some
samples for the Microscope
I do not remember if these
filaments were in an open
box or were in forms,
you might put a few in an
open Carbon box & the
balance in forms to see
what difference if any
there is where air can &
Cannot circulate,

Experiment No 2 —

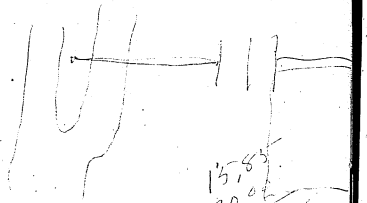
I think it would do no harm to put in one of your regular run crucibles & all around the forms about 2 or 3 lbs of ~~coal~~ Cannel Coal powdered ~~[illegible]~~ say in pieces about size of pea, The inside of the mould would then be filled with a substance which would give off fixed Hydrocarbon gases from 250 Fahr clear up to a white heat, Thus it would clear out of mould all the Water

13 12
16 11
17 3
16 8

Na_2SO_2



Vapor formed by the decomposition of the wood & that absorbed by the forms. & leave at all times a non oxidizing atmosphere - I dont think it would deposit on filaments or change or hurt them in any way for regular use - so I think you better try it & note effects & deliver to me 20 good ones for an order number



15,85
20
16,88

15,85
~~14~~50
7925
1585
2377
1000
1377
200) 3377

50
20
100

17

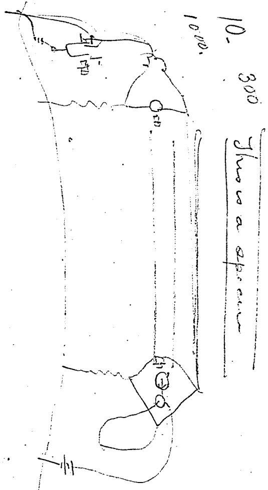
16 88

Edison — Small book

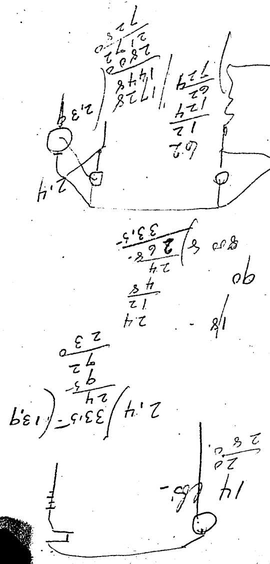
Break a Woodhouse & Rawson lamp & Examine filament under Microscope to see what its made of —

Small book

Halzer - take 10 Siemens Lamps break Vac Retip & run through our regular vacuum process ~~so they~~ working them just as high on pumps as regulars then make an order number for them to be set up at 80 candles - You know



if we attempt to set.
Siemens 16 Cp lamps
up at 80 candles they
drops to 40 inside 10
minutes, this is because
the air is not all out
of carbon & clamps
This will be prevented by
Exhausting our way &
thus we can get the
true Value of Siemens
Lamp at 80 candles;



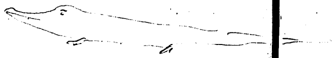
Edison — Small book

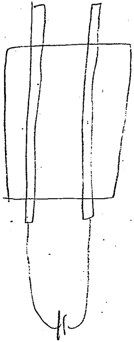
Martin has some lamps which he cannot set up at 5 times normal they are the new 2½ watts storage the lamps melt, find what candle power they have at 160 c per h p & then set them up at 5 — ~~times~~ this cp —

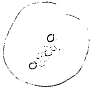
2 = See ~~that~~ the "ping" vial Dave put to soak is cleaned & find way to get fibres out so as to get a lot for curve probably weak caustic would take outside without hurting fibre —

Lawson — Smallbook

Please run through full process 100 Reg A filaments only one in a form with the forms at an angle of 45 degrees —



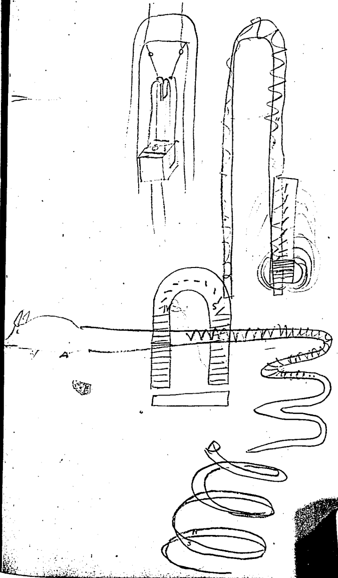




200.

$\frac{1}{7}$

$\frac{1}{7}$ 7. milio



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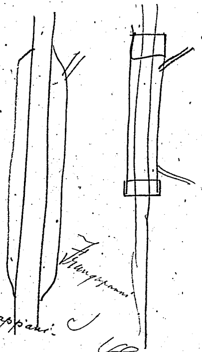
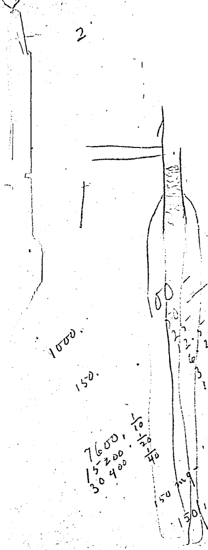


Frangipanni

Frangipanni

2



760
380
190
95
47.5
23.75
11.85
6.9
3.5
1.75
.85
.45
.22
.11
1/10 m.

100
50
25
12.5
6.25
3.12
1.55
.75
.37
.18
.09
.045
.023
.012

1000.

150.

7600. 1/10
15200. 1/20
30400 1/40

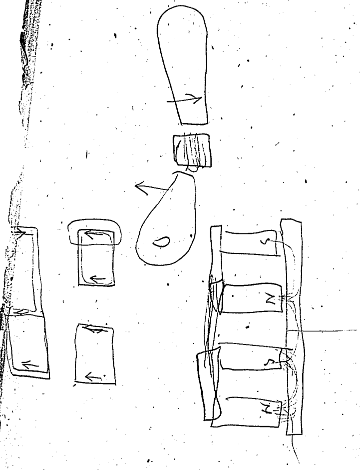
150 mg

150 | 1500 | 10

1/10 mg.

.006 — 1/20
.003 — 1/40
.0015 — 180
.0007 360

[ITEM FOUND IN BOOK]



13	827
14	890
15	953
16	1016
17	1079
18	1142

890
63
953

953
63
1016

1016
63
1079
63
1142

4200
1.3
12600
4200
54600

66) 54600 (827

66) 42000 (636

8270
636
8906

175
1000
175

~~4250 tons daily~~

~~12 at 12 cents ton,~~

~~Cost 187~~

1000 tons daily cost $1720,
or 172 cents mining being
10 cents ton, 17.5 ore 1/6 net,
or 4125 tons,
Cost ming $412 — If we
mine 1/16 more & throw it away
to raise average & it assays
6% — We obtain
125 tons more 66% Conc
by mining 4125 & throwing away
687 tons Costing $69 —
to brick etc this - Costs with mining
$112, or this are less than
$1.00 ton on Car

6870

3438) 61878 (18,
3438
27498
27504
175
16
159. 125 tons.

4125

69
43
112.

4125
18
33000
4125
74250 (11.25 16) 66000 (4125
66
82
66
165
132
330

125
34
500
375
4250

64
20
16
40
32
80

687
6
4122

6) 4125
687.

3438 - 18

687

66000
4122
61878

4125 412 67 479 4

670

4125) 47950 (11,3
41250
6700
4125
15750
12375

825
6
4950

66) 77550 (1175

5) 4125
825

4125) 49500 (12
41250
82500
82500

4125) 51560 (12.5
41250
103100
82500
206000
165000
41000

4125
1031
5156

1/6 Dump 11.3 18 net

		net	Total
1/5	12	18.2	19.8
1/4	12.5	18.7	20.3

66) 11550 (175 tons

1031
476
6186

203
16
18.7

825
6
4950

11550

19.8
1.6
18.2

5156
175
25780
36092
5156
902300
6186
84044

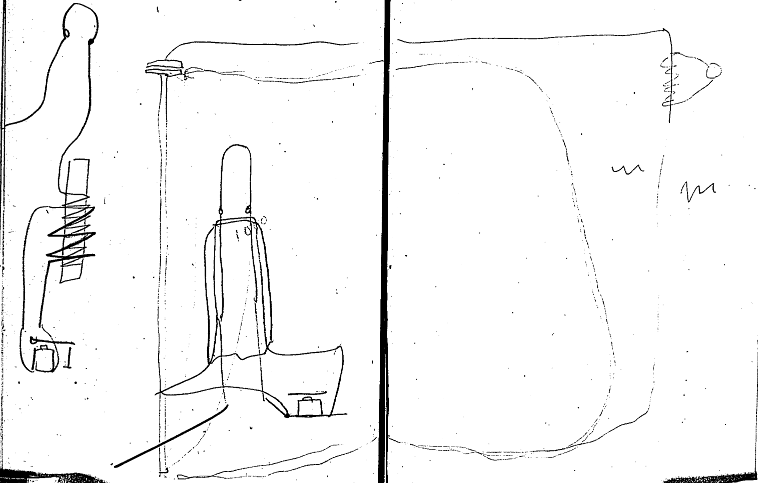
4950
175
24750
34650
4950
866250

4125) 84044 (2
8250
1540

4125) 816750 (198
41250
404250
371250
330000
330000

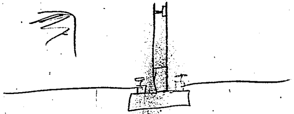
203
175
2.8

4125
28
33000
8250
115500



John Ott -

Try this



8.50 Volts

800.

20.
20.
5
25
10
50.

400 hp

70

100.

800 —	150 ~~Valts~~ 400 amp
400	75 — "
200	37.5
100	18.52
50	9 26
25 —	4.63

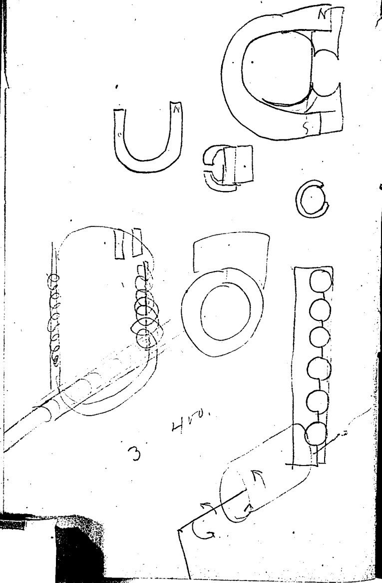
4 Valts.

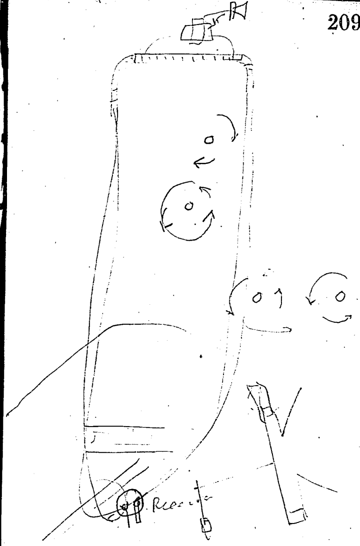
440

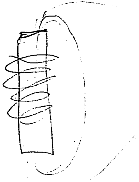
44
400
17.600 4
70.400

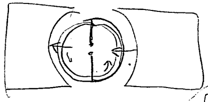
2 hp

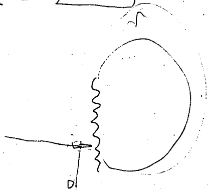
3'

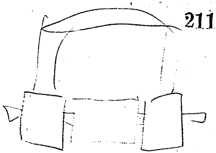

N
N
S

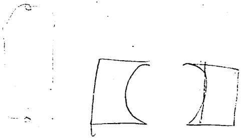


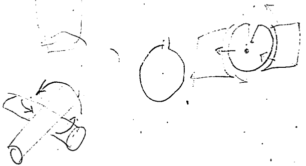


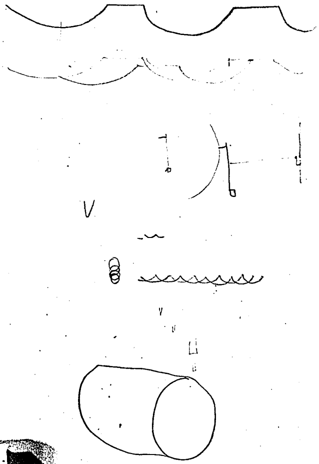


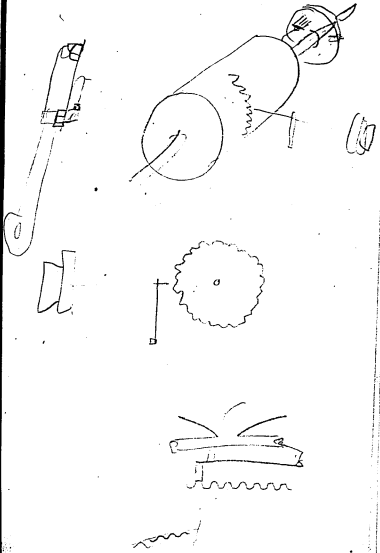


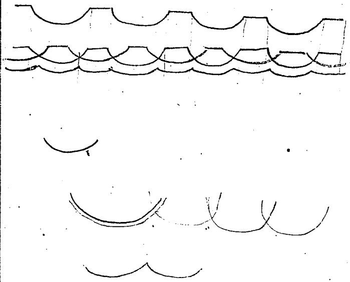




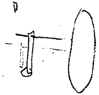






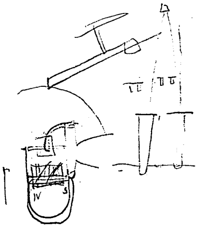


50
4
200.



6.

S 2



36.

316

360 000

29000 750

203 000 000

159
875
10.34

12.77 oz per Reel
200

16) 2554 (159
16
95
80
154
144

187
16

11/110. 65
20
3

20.

875
6
5250
8750
1400

11) 140 (12.77 oz
110

875) 1100 (1.25 Reel per lb 16 oz
875
2250
1750
5000
4375

65) 378 (5.81
325
530
520
10

1/14 added — or added —

14.3

30c worth Cake off —

30) 340. (

14) 1232 (88
112
112

150
140
60) 280
240
350

4.80

112
11
112
112
1.23

5.30
.65
2650
3180
3.4 28
3
84 —

350.

58c

fuel 14) 347 (24.
28
67
56

142
84
468

14
366
84.6
120.6

1136
178.28

255) 2240 (89
2040
2.55

2240) 400 | 2240 (56
2000
240

1/10 84

40c for 224 — 1/10

25 1/2 c for 224
4
102.0

40c for 224
4
160 —

30 Cake
24 fuel off —
54 — Saved — per ton,
33 Labor Saved —
10 cents
~~Labor 8~~

.50) 1000 (66.

100 tons

150
36
900
450
5400

150
54
600
750
8100

Limestone

5c

Saved

150 tons

81.00 Coal
54.00 Labor
15.00 Lime
150.00

5 6 3

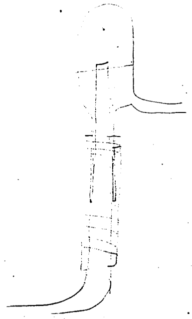
7c

6c —

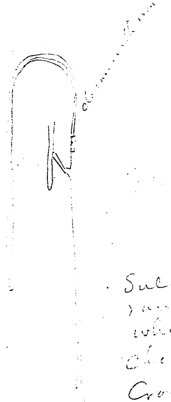
14) 3.70 (26
28
90

200

200 tons 200 dollars



Stokes Phil Trans 1862 p. 603

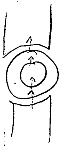


pyrogallate

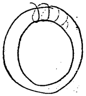
℥ 10 -

Sul acid allowed
run down tube
while pumping
cleans it =
Crookes —

Silk dissolves in HCl —



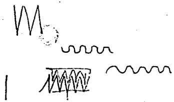
Dissolve

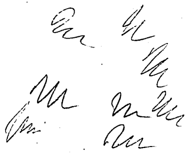


Coaltinfe

N-84-05-29

new magneo Caloric
Tanning –
Ore milling
Heating Iron for forging
passing Current through
pig iron & magnetizing





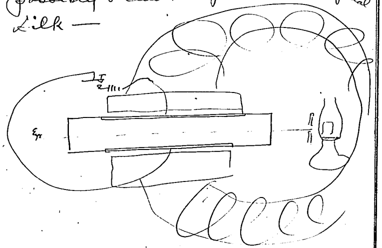
New York Notebook, N-85-05-22

This notebook covers the period May-November 1885. All of the entries are by Edison except for one entry on the telephone by Ezra T. Gilliland. Edison's notes and drawings relate to the preparation of nitrogen compounds, the extraction of oxygen from the air, and the production of artificial silk. There are also calculations about the phonoplex, witnessed by John F. Ott, and a set of drawings labeled "Thermo." The spine is labeled "23." The book contains 292 numbered pages.

Blank pages not filmed: 30-33, 72-95, 100-292.

x E-172

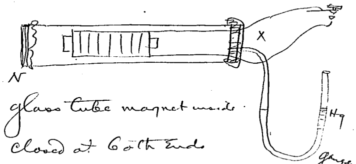
I propose to form some new nitrogen Compounds by Electrolysing different Electrodes Coated with various substances capable of being nitrogenized - using Ammonia as the Electrolyte. Thus giving off ~~a~~ Nacent Nitrogen by Secondary Action - possibly I can thus produce artificial Silk —



Produces a pressure on the Liquid a la ~~Hg~~ ampermeter + alters the ray of light perhaps should be polarized

May 22 1885

Process for preparing Oxygen



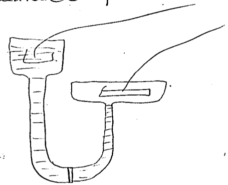
glass tube magnet inside
closed at both Ends
End N has porous material
say bladder - Stucco etc
fitted air tight = Oxygen
being magnetic is drawn
through the pores while
nitrogen is neither Magnetic
or Diamagnetic being absolute
Zero =

Red hot platinum for porous
filter also Cocoanut Charcoal
Carbonized paper charcoal - Etc

May 22 1885

Theomagnet may condense the gas already in and produce a movement of the diaphragm - idea for telephone or ~~telegraphic~~ instrument

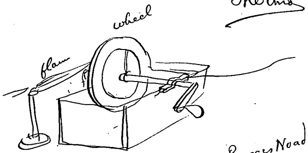
Standard EMF =



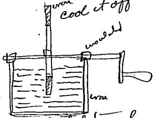
Water (distilled) passing through meerschaum plug by gravity give EMF - plat Electrodes =

May 22 1885 TAE

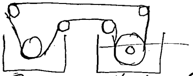
Thermo



See Preeces Noad p 406.



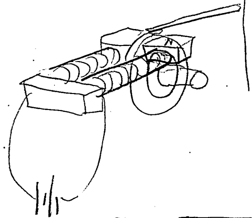
metal trough
fused salt Borax say

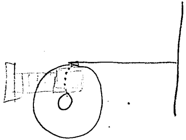


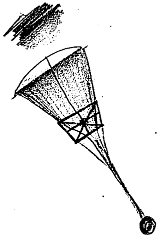
Cold Hot water

May 28 1885

on Emg - powerful constant field attracts current in direction rotation thus aiding regular current on its Effect on H_2O capillarity







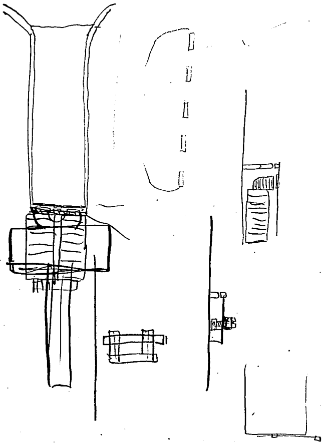
Louisville

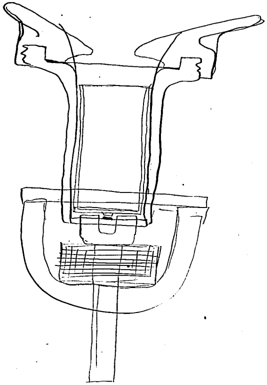
Louis

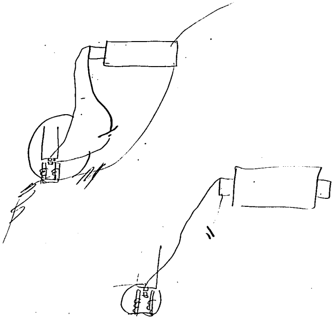
Louisville is the main city in

now by Saint Paul my golden dream is out

L now is the winter of our discontent







4 X 5

6 count both sides

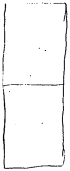
7

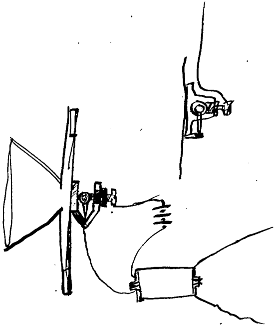
12/500(41·6
48
20
12
80

76
480.
40
520.

·12/500 ·025

500/1200(2   0·25



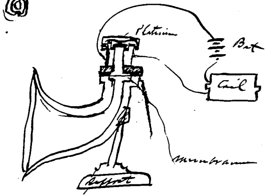


Entire mechanism to be attached to the diaphragm - Casting made so that a metal ball will rest on a pointed leg at the bottom and vibrate between a solid anvil on the diaphragm and an adjustable Contact point behind it -

Continued from page 23

object being to preserve the adjustment against the bulging of the diaphragm due to wind puffs or other causes — another plan for accomplishing same end ~~will~~ is shown below

a

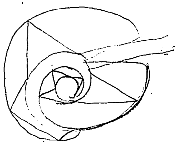


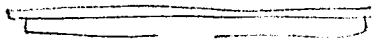
a small membrane is introduced into the mouth piece down near the end where the chamber becomes very small so that nothing except

Continued from 25

pure sound waves reaches the small disc of platinum - this also prevents the contact point from fouling from moisture, breath, or other causes - The platinum point is made to bridge across the two Electrodes a Rubber cap is screwed down over the upper End which serves double purpose of a Cover protector and an adjustment - Think the best results obtained from transmitter with opening about 3/16 inch Diameter -

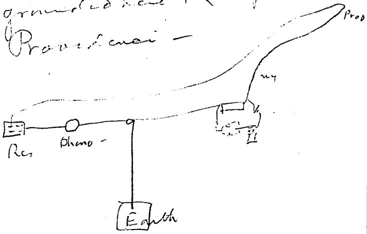
E T Gilliland
Oct 6th 1880





Nov 10 1885 J F Ott

Phonoplex Experiments on proportioning Coils made on Boston Telephone Line grounded here & looped at Providence —



TAE

Nov 10 1885 John F. Ott

Phonoplex Expts Contd

7 ohm Coil - 1 cell battery
no Condenser - no res nothing dont move
reg weight. $2\frac{1}{2}$ mf Condr makes it growl -

2 cells imperfect writing 70 sheets Condsr
writing good - no res just in margin

3 cells. 200 ohms writg good - no Condsr
85 sheets get it thro 900 ohms -

4 cells 600 ohm no Condr 1400 ohms
with 85 sheets,

5 Cells ~~4~~00 ohms - 1400 ohm with
85 sheets -

Over

Nov 10 1885 — J. F. Ott

Phonoplex Expts

17 ohm Coil - primary only -

no res no Condr nothing 85-sheets rtq

2 cells growls no res no Condr - -
Condr weakens it so no growling

3 cells - just get fair writing only no
Res no Condr Condr weakens it,

4 cells 600 ohms Condr weakens

5 cells - 800 ohms Condr weakens

2 - 17 ohm Coils Multiple arcd -

1 Cells rtq growls with 85-sheets Condr
2 cells - just get it no res. 85-sheets
200 ohms, "

3 cells 400 ohms no Condr 85-sheets
600 ohms

4 cells 1000 ohms no Condr — 1400
ohm with 85-sheets

Nov 10 phonoplex — J.F.Ott Continued

2 - 17 ohm Coils multiple arcd + battery multiple arcd (10) cells 1/2 Res each - so as to run from 1 to 5 cells each of 1/2 the internal Res —

1 big cells not q got it shaky with 85 sheets no res -

2 big cells — little shaky no res - -

85 sheets of the 300 ohms -

3 Cells - 500 ohms - 1000 ohm with 85 - Sheets

4 Cells - 1200 ohms - 1400 ohms on 85 - sheets -

Nov 10 1885

J. F. Ott Phonoplex contd

2 - 7 ohm Coils nucly cleaned.

Double size battery

4 cells ok no res 1000 ohms - 85 sheets -

3 cells - ok no res 800 on 85 sheets

Single battery -

Diff coils - longer than 7 ohm coils about inch - iron twice dia -

Res .48 Res, 4 layers -

1 Cell - notg on no res notg on 85 sheets -

2 cells - ntg on no res growls on 85 sheets -

3 cells - notg on no res growls better on 85 sheets

4 cells - ntg on no res ng on 85 -

J F Ott

Nov 10 1885 Phonoplex Contd

Big Coil. using primary only

Res 4.25 ohms. marked No 1.

1200 ohms 4 cells No Res

72 sheets Condr 1800 ohms

3 cells 300 ohms no condr

900 ohms –

2 cells – little shaky on no res

400 ohms on 72 sheets –

---

another large Coil –

No 2 – using primary only

Res primary 6.05 shorter coil

¼ amount iron core –

2 cells growls slightly 85 sheets

writing only fair –

3 cells no res just get writing

300 ohms with 85 sheets –

4 cells 100 ohms no res 400 ohms

with 85 sheets –

2 [illegible] Nov 10 1885 — Phonoplex Contd

Another Big Coil No 3

Res primary 4.125 — 3/4 inch iron Core —

4 cells 400 ohms no res 1200 ohms with 85 sheets

3 cells — 200 ohms no res 600 ohms with 85 sheets —

Big Coil No 4

primary only used Res. 1.23,

3 cells weaken no res 300 ohm in 85 sheets,

4 cells — weaken no res 300 on 85 sheets —

Nov 10 1885

J. F. Ott Phonoplex Continued,

Big Long Coil - broken wooden ends - Res primary 1.37

4 cells 400 ohms no Conds ~~for~~ 1400 ohms 85-Sheets =

Same Coil using Secondary 64 ohms in Line -

4 Cells 600 no res - 1200 with 85-sheets,

Coil No 4. using Secondary, to Line - Res secondary - 77 1/2 ohms -

4 Cells - growls at no res - 85-sheet 300 ohms -

Nov 10 1885 TAE—
J.F.Ott Phonoplex Continued

No 1 Coil using Secondary in line Res Secondary ~~32~~ 78 ohms
4 Cells - weak no res 85-sheets.
300 ohms

No 3 Coil
Secondary to line - Res
Secondary - 78-
4 cells; weak no res - 85-sheets
300 ohms.

No 2 secondary to line. Res Secy 75-ohms ground no res 300 ohms 82 sheets —

Nov 10 1885 TAE
J.F.O.tt Phonoplex—

The two 7 ohm Cards in series Reg way

4 Cells 200 ohms 48 sheets. 600 ohms

5 Cells 800 ohms no Cards
1100 with 32 sheets

6 Cells 1000 - no Cards - 1600
32 sheets,

Long coil ·41 No 7 -
4 Cells just grounds with 72 sheet

Nov 10 Phonoplex. J.F.Ott

Experiment on jumping weights
7 ohm Coil reg 4 on line —
Condsr plug 1000.
72 sheets Condsr —

Ring split 700.
flat ring 600
6

 1000

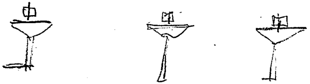
 800

 1000

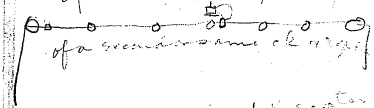
The small weight on weak current needs no
only heavy weight on strong ckts improved by
Condsr —

Nov 10 1885 TAE J.F. Ott

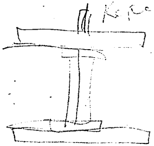
Principles



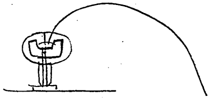
The rubbing [illegible] opens & closes the following

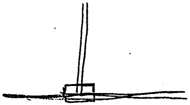


of a secondary [illegible]



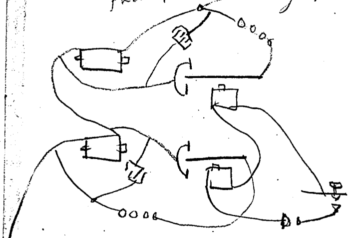
J. F. Ott





Nov 10 1885
Phonoplex TAE

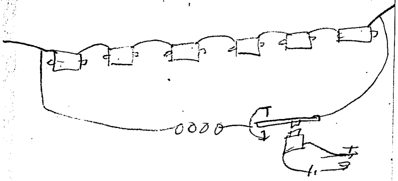
J. F. Ott

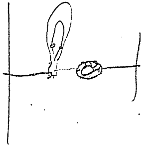


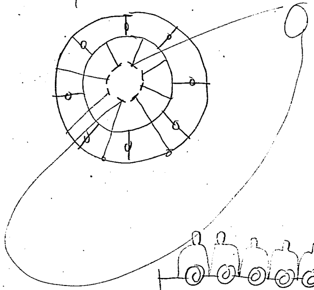
Dont improve but little —

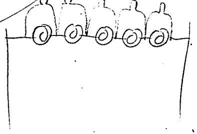
Tried 11 .48 primaries, 4 cells
no better than the single 70 [illegible]
on break dont use light weight
or no weight at all & if no weight
at all use no condenser as it
weakens it greatly

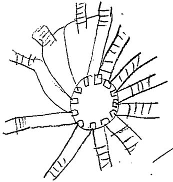
Nov 10. 1885
J. F. Ott

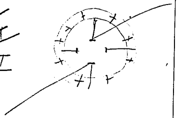


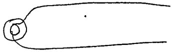


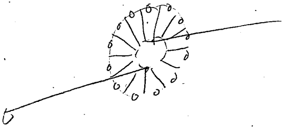


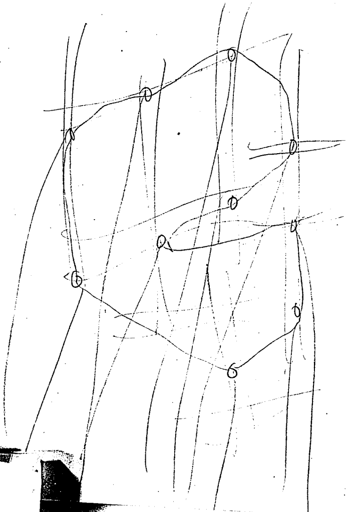


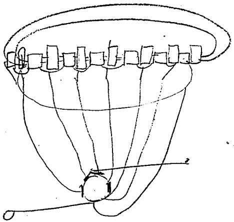


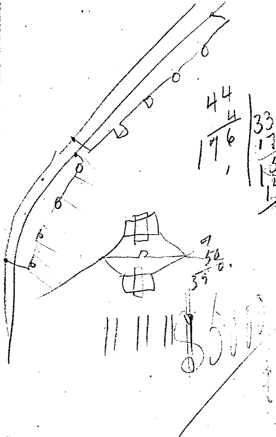












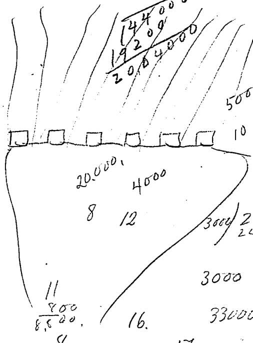
44
4
176

33000 (187
176
1540
1408
1320
56

187.

15000

2400
860
144000
19200
2064000



5000
10

20.000.
4000
8 12

3000) 24000 (80
24

3000
33000

11
800
8.500.
8

16.
17
11

250
80
3.3
3.30
3.50
1 50
8.60

200
40
2400) 8000 (3.3
7200
800
4

8 7 5 39½ 7⅛

108. 2⅝ [illegible]

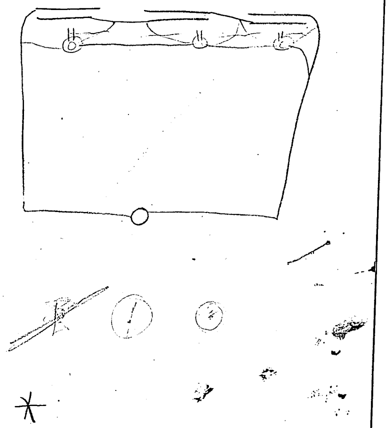
39. 43 — ½

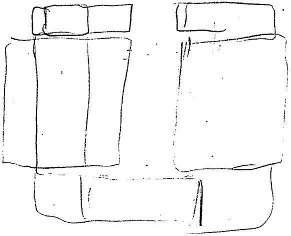
21 —

5′ 21.

15′

130 ...





5000/80,000 (1
500

3/4.

4-
5

1.2

7.

1000.

190

1

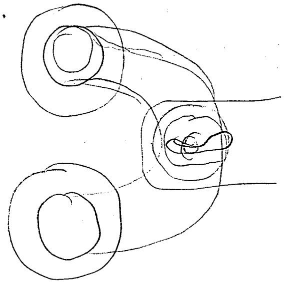
7354 - 650
368

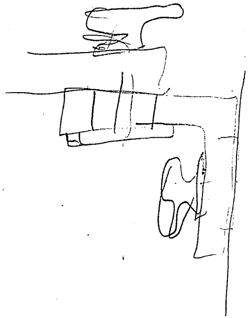
13/1000 (7
91
90

67
4
13
4000
65000
268,
368,

918.

7000.





New York Notebook, N-85-05-28

This notebook covers the periods May-July 1885 and January 1886. Most of the entries are by Montgomery Waddell. There are also a few entries by Edison. The book contains the results of tests by Waddell on secondary batteries for miners' lamps, along with drawings by Edison of electric power distribution systems. The spine is labeled "24." There are 308 numbered pages.

Blank pages not filmed: 232-235, 266-308.

x E-172 N-85·05·28

28th May 1885

No.

Continuation of Experiments
on Secondary Battery for Miners Lamp.

— W. Haddell

Internal resist. of cell of tin plates,—
(exposed surface of one = 1.2 sq in)

Solution 50 grms.. Zinc sulphate
50 " Amm. citrate of Iron
100 " Water.

Resist. Galv. + Battery = 7.2 ohms

$$\frac{d}{d_1} = \frac{G+B+r}{G+B}.$$

$$\frac{76}{46} = \frac{7.2+r}{7.2} \; ; \; \frac{30}{46} = \frac{r}{7.2}$$

$\therefore r = 5$ ohms, before charging.

 #41 (prior on p. 3.) Zn & Zn.

Time	Defl.
11h 09' 00"	60 charge
19' 00"	60 "
19' ----	disch.
10	150
20	120
30	70
40	24
50	3 "
1.) 20' 00	9
15	13
30	15
45	16
2.) 21' 00	17
15	17
30	17
3.) 22' 00"	17
4.) 23' 00"	17
5.) 24' 00"	17
6.) 25' 00"	16
7.) 26' 00"	16
8.) 27' 00"	16
9.) 28' 00"	16
10.) 29' 00"	16
12.) 31' 00"	16
13.) 32' 00"	15
14.) 33' 00"	15
15.) 34' 00"	15
16.) 35' 00"	14
18.) 37' 00"	14
20.) 39' 00	13

Fresh Plates

Time	Defl.
11h 59' 00"	60 charge
12h 09' 00"	60 "
09 -- 3	140 disch
10	100
20	90
30	80
40	73
50	62
1.) 10 -- 00	48
15	24
30	4
35	0
45	2
2.) 11' 00	2
12' 00"	3

Deposit of crystals on both plates

Probably $ZnSO_4$

#41 20 grms $ZnSO_4$, 40 " Amm Cit. of Zinc, 60 " H_2O — Zn & Zn

1h 01' P.M.	60 charge
11 "	60 "
11 -- 9	150 disch
10	145
20	40
30	3 "
40	8
50	13
1.) 12 -- 00	14
15	15
30	16
2.) 13 -- 00	15
30	14
3.) 14' 00	13
30	12
4.) 15 -- 00	11
30	10
5.) 16' 00	9
30	9
6.) 17' 00	8
30	8
7.) 18' 00"	7
9.) 20' 00"	7
11.) 22' 00"	6
14.) 25' 00"	5

Deposit as before of granular crystals on plates, little or no other deposits

✗ 41 – 15 grms $ZnSO_4$ 25; 15 " am. cit. of K 25; 60 " H_2O 100 — Liu & Li.

1h 58' 00" .. 60 charge
2h 08' 00" .. 60 "
08 .. 8 .. 95 disch
10 .. 90
20 .. 81
30 .. 79
40 .. 76 "
50 .. 72
09 .. 00 .. 68
15 .. 59
30 .. 55
45 .. 47 "
2) 10 .. 00 .. 42
15 .. 33
30 .. 22
45 .. 10
50 .. 6
3) 11 .. 00 .. 3

2h 17' 00" .. 60 ch
27 00 .. 60 "
27 .. 6 .. 95 disch
10 .. 86
20 .. 83 "
30 .. 82
40 .. 81
50 .. 80 "
1) 28 .. 00 .. 76
15 .. 65
30 .. 58
45 .. 49
3) 29 .. 00 .. 39
15 .. 26
30 .. 10
40 .. 5
45 .. 3
50 .. 2

✗ 41 – 10 grms $ZnSO_4$ 20; 10 " am cit 20; 50 " H_2O 100 — Liu & Li.

2 55 00 .. 60 charge
3 05 00 .. 60 "
05 .. 5 .. 80 disch
10 .. 72
20 .. 58 "
30 .. 54
40 .. 51
50 .. 49
1) 06 .. 00 .. 47
15 .. 45
30 .. 44
45 .. 42
2) 07 .. 00 .. 39
15 .. 36
30 .. 34
3) 08 .. 00 .. 33
30 .. 26
4) 09 .. 00 .. 12
15 .. 5
30 .. 1

3h 20' 00" .. 60 charge
30 .. 00 .. 60 "
30 .. 4 .. 70 disch
10 .. 68
20 .. 65
30 .. 62
40 .. 60
50 .. 57
31 .. 00 .. 55
15 .. 52
30 .. 48
45 .. 45
2) 32 .. 00 .. 42
15 .. 40
30 .. 38
3) 33 .. 00 .. 33
30 .. 30
4) 34 .. 00 .. 24
15 .. 19
30 .. 11
45 .. 7
5) 35 .. 00 .. 3

#41 — 15 grms ZnSO4 / 15 " Am. citrate / 100 " H2O

Zn & Zn

3h 57' 00" - 60 charge
4h 07' 00" - 60 "

07 - 7 - 92 discharge
10 - 88
20 - 82
30 - 78
40 - 74
50 - 70
1.) 08 - 00 - 66
15 - 59
30 - 52
45 - 47
2.) 09 - 00 - 36
15 - 11
30 - 1

4h 12' 00" - 60 charge
30' 00" - 60 "

22 - 6 - 95 disch
- 90
30 - 87
40 - 84
- 80
50 - 77
1.) 23' - 00 - 72
15 - 66
30 - 60
45 - 55
2.) 24 - 00 - 49
15 - 28
30 - 26
40 - 4
50 - 0

#41 - 10 grms ZnSO4 / 15" 10 " Am. cit / 100 " H2O

Zn & Zn

4h 53' 00" - 60 charge
5h 03' 00" - 60 "
03' - 5 - 90 disch
10 - 84
20 - 71
30 - 66
40 - 63
50 - 60
1.) 04' - 00 - 57
15 - 52
30 - 48
45 - 45
2.) 05' - 00 - 42
15 - 38
30 - 35
3.) 06' - 00 - 29
30 - 13
40 - 4
45 - 0

5h 05' 00 - 60 charge
15' 00 - "
15 - 6 - 92 discharge
20 - 81
- 76
30 - 73
- 70
- 66
1.) 19 - 00 - 62
- 55
- 49
2.) 20 - 00 - 45
- 43
15 - 40
- 30 - 38
3.) 21 - 00 - 36
30 32
45 21
4.) 22 - 00 - 9
15 - 1

#41 (Previous solution)　　　　29th May. 1885.　　　　[illegible] & [illegible]

9h 48' 00" - 60 charge
50' 00" - 60 "
57' - 6 - 80 disch.
10 - 78
20 - 76
30 - [illegible]
40 - 70
50 - 65
1.) 59 - 00 - 60
15 - 53
30 - 48
45 - 44
2.) 00 - 00 - 42 "
15 - 41
30 - 40
45 - 38
3.) 01 - 00 - 35
15 - 33
30 - 32
4.) 02 - 00 - 30
30 - 27
5.) 03' 00 - 24
30 - 20
40 - 13
45 - 10
6.) 04 - 00 - 7
15 - 4
30 - 3

10h 13' 00" - 60 charge
23' 00" - 60 "
23' - 5 - 80 disch.
10 - 77
20 - 76
30 - 75
40 - 74
50 - 71
1.) 24' - 00 - 67
15 - 59
30 - 53
45 - 48
2.) 25' - 00 - 45
15 - 41
30 - 39
45 - 37
3.) 26 - 00 - 35
15 - 34
30 - 33
4.) 27' - 00 - 31
30 - 28
5.) 28 - 00 - 26
30 - 23
40 - 19
50 - 15
6.) 29 - 00 - 13
10 - 10
20 - 7
30 - 5
40 - 5
7.) 30' - 00 - 4

#41 - Same solution)　　　　[illegible] & [illegible]

10h 41' 00" - 60 charge
51' 00" - 60 "
51' - 7 - 80 discharge
10 - 78
20 - 76
30 - 74
40 - 68
50 - 63
1.) 52' - 00 - 59
15 - 54
30 - 49
45 - 47
2.) 53 - 00 - 45
15 - 43
30 - 41
45 - 39
3.) 54 - 00 - 37
15 - 35
30 - 33
4.) 55' 00 - 30
30 - 26
5.) 56 - 00 - 20
10 - 12
20 - 8
30 - 6
40 - 5
50 - 4
6.) 57' 00 - 3
10 - 2

11h 00" - 00" - 60 charge
10 - 00" - "
10 - 5 - 80 discharge
[illegible] - 76
[illegible] - 75
[illegible] - 72
[illegible] - 73
[illegible] - 70
1.) 11' [illegible] - 65
[illegible] - 58
[illegible]
[illegible]
2.) 12' - 00 - 44
15 - 42
30 - 40
45 - 38
3.) 13' - 00 - 36
[illegible] - 35
30 - 33
4.) [illegible] - 00 - 31
30 - 27
5.) 15' 30 - 22
15 - [illegible]
30 - [illegible]
45 - 13
6.) 16' 00 - 10
15 - 7
30 - 6
45 - 5
7.) 17 - 00 - 4
30 - 4
8.) [illegible] 00 - 3

#41 - Same solution

11h 39' 00" - 60 charge
49' 00" - 60 "
49' - 6 - 86 disch.
10 - 83
20 - 80
30 - 78
40 - 75
50 - 67
1) 50 - 00 - 62
15 - 58
30 - 55
45 - 52
2) 51' - 00 - 49
15 - 47
30 - 45
45 - 42
3) 52' - 00 - 40
15 - 38
30 - 36
4) 53' - 00" - 32
15" - 22
30 - 15
45 - 10
5) 54' - 00" - 6
15' - 5
30' - 4

11h 59' 00" - 60 ch.
12h 09' 00" - 60 "
09 - 8 - 82 disch.
10 - 80
20 - 80
30 - 80
40 - 78
50 - 75
1) 10' - 00 - 71
15 - 64
30 - 57
45 - 51
2) 11' - 00 - 49
15 - 46
30 - 44
45 - 42
3) 12' - 00 - 40
30 - 37
4) 13' - 00 - 32
30 - 23
45 - 15
5) 13 - 00 - 12
15 - 9
30 - 7
45 - 5
14' - 00 - 5

#41 (Same solution)

12h 39' 00" - 60 charge
49' 00" - 60 "
49 - 5 - 76 discharge
00 - 75
20 - 70
30 - 70
40 - 65
50 - 55
1) 50' - 00 - 53
15 - 49
30 - 47
45 - 45
2) 51 - 00 - 42
15 - 40
30 - 38
45 - 36
3) 52 - 00 - 35
15 - 33
30 - 31
4) 53' - 00 - 29
30 - 27
5) 54 - 00 - 25
30 - 22
6) 55' 00" - 19
10" - 15
20" - 10
30" - 8
45" - 6
7) 56' - 00 - 4

1h 07' 00" - 60 charge
17' 00" - 60 "
17 - 4 - 90 discharge
10 - 76
20 - 71
30 - 70
40 - 65
50 - 60
1) 18' - 00 - 54
15 - 49
30 - 46
45 - 42
2) 19' - 00 - 40
15 - 38
30 - 35
45 - 34
3) 20' - 00 - 33
15 - 32
30 - 30
4) 21' - 00 - 27
30 - 26
5) 22' - 00 - 25
30 - 23
6) 23' - 00 - 20
30 - 18
7) 24' 00 - 12
15 - 7
30' - 6
45 - 5
8) 25' 00 - 4

#41 (Same Solution) Li x Li

0h 35' 00" - 60 charge
35' 00" 60
35 - 2 - 75 disch
10 - 72
20 - 71
30 - 70
40 - 65
50 - 61
1.) 39' - 00 - 56
15 - 52
30 - 50
45 - 48
2.) 40 - 00 - 46
15 - 45
30 - 44
3.) 41 - 00 - 39
30 - 34
4.) 42 - 00 - 30
30 - 28
5.) 43 - 00 - 26
30 - 24
6.) 44 - 00 - 22
30 - 18
40 - 11
7.) 45' - 00 - 7
15 - 4
30 - 4

2h 51' 00" 60 charge
3h 01' 00" 60
01' - 6 - 90 discharge
10 - 76
20 - 75
30 - 72
40 - 68
50 - 64
1.) 02' - 00 - 60
15 - 54
30 - 48
45 - 46
2.) 03' - 00 - 46
15 - 41
30 - 39
3.) 04' - 00 - 36
30 - 32
4.) 05 - 00 - 30
30 - 27
5.) 06 - 00 - 24
30 - 20
45 - 13
6.) 07' 00 - 9
15 - 6
30 - 5
45 - 5

#41 Same solution - same plates Li x Li

3rd charge
3h 45' 00" - 60 charge
55' 00" - 60
55 - 6 - 90 disch
10 - 73
20 - 70
30 - 68
40 - 65
50 - 62
1.) 56' - 00 - 59
15 - 53
30 - 50
45 - 48
2.) 57' - 00 - 45
15 - 42
30 - 40
3.) 58 - 00 - 37
30 - 34
4.) 59' - 00 - 30
30 - 26
5.) 00 00 -
10 - 12
20 - 9
30 - 6
40 - 4

4th charge
4h 2 00' - 60 charge
34' 00" - 60
34 - 2 - 80 disch
10 - 74
20 - 67
30 - 65
40 - 61
50 - 58
1.) 35' - 00 - 54
15 - 52
30 - 47
45 - 43
2.) 36 - 00 - 42
15 - 40
30 - 39
3.) 37 00 - 37
30 - 34
4.) 38' 00 - 29
15 - 25
30 - 23
45 - 18
5.) 39 00 - 12
15 - 8
30 - 5
45 - 3

41 5th charge.

5h 09' 00" - 60 charge
19' 00" - 60 "

19' - 6 - 92 discharge
10 - 81
20 - 66
30 - 63
40 - 60 "
50 - 57
1) 20' - 00 - 53
15 - 50
30 - 47
45 - 45
2) 31' - 00 - 42
15 - 38
30 - 36
45 - 35
3) 22' - 00 - 32
15 - 31
30 - 29
4) 23' - 00 - 26
30 - 19
45 - 13
5) 24' - 00 - 8
15 - 5
30 - 4
6) 25' - 00 - 3

41 6th charge.

1st June 1885
Lui + Lui

9h 19' 00 - 60 charge
29' 00 - 60 "

29 - 4 - 70 disch.
10 - 55
20 - 52 "
30 - 49
40 - 47
50 - 44
1) 30' - 00 - 43
15 - 40
30 - 37
45 - 35
2) 31' - 00 - 34
15 - 32 "
30 - 30
3) 32' - 00 - 26
30 - 23
4) 33' - 00 - 20
30 - 19
5) 34' - 00 - 17
30 - 14
6) 35' - 00 - 12
30 - 7
45 - 5
7) 36' - 00 - 4

7th Charge
10h 09' 00 - 60 Charge
14' 00 - 60 "
14' - 4 - 100 disch.
10 - 82
20 - 70 "
30 - 64
40 - 62
50 - 60
1) 18' - 00 - 56
15 - 51
30 - 48
45 - 45
2) 19' - 00 - 42
15 - 40
30 - 36
3) 20' - 00 - 34
30 - 29
4) 22' - 00 - 26
30 - 23
5) 23' - 00 - 19
30 - 15
45 - 11
6) 24' - 00 - 6
15 - 5
30 - 3

 #41 { 5 grms -- ZnSO4, 50 " -- Am. Acet of ?, 100 " -- H2O } Zn + Zn.

3h 31 - 00 - 60 charge
31 - 00 - 60 "
31' -- 5 - 70 disch.
10 - 64
20 - 56 "
30 - 58
40 - 57
50 - 50
1.) 32' -- 00 - 49 "
15 - 47
30 - 45
45 - 42
2.) 33 - 00 - 39
15 - 37
30 - 33
45 - 31 "
3.) 34 - 00 - 25
15 - 25
30 - 23
4.) 35' - 00 - 21
30 - 20
5.) 36' - 00 - 19
30 - 18
6.) 37 - 00 - 17 "
30 - 16
7.) 38 00 - 15
30 - 14
8.) 39' 00 - 12
30 - 10
9.) 40' 00 - 8
30 - 5
10.) 41 00 - 2

3h 44' 00" - 60 charge
50' 00" - 58
54 00 - 40 "
54' - 3 - discharge
10 - 47
20 - 46
30 - 45 "
40 - 45
50 - 44
1.) 55' 00 - 43
15 - 41
30 - 39
45 - 36
2.) 56 - 00 - 33
15 - 30
30 - 27
45 - 25
3.) 57 - 00 - 24
15 - 23
4.) 58' 30 - 22
00 - 21
30 - 19
5.) 59' 00 - 17
30 - 15
6.) 00 00 - 10
30 - 7
45 - "
7.) 01 00 - 2 "

#41 - same proportions as last. Zn + Zn.

4h 39' 00" - 60 charge
49' 00" - 60 "
49' -- 5 - 70 disch
10 - 53
20 - 45
30 - 43
40 - 42 "
50 - 41
1.) 50' 00 - 39
15 - 37
30 - 35
2.) 45 - 33
51' 00 - 31
15 - 28
30 - 26
3.) 45 - 23
52' 00 - 21
15 - 20
30 - 19
4.) 53' 00 - 18
30 - 17
5.) 54 00 - 16
30 - 15
6.) 55' 00 - 14 "
30 - 13
7.) 56' 00 - 11
30 - 10
8.) 57' 00 - 9
30 - 7
9.) 58' 00 - 5
30 - 4
10.) 59 00 - 3

5h 10' 00" - 60 charge
20' 00"
20 - discharge
10
20
30
40 "
50
00
15
30
45
00
15
30

Charging current became too weak.

H

2nd of June 1885

41. 2nd charge of precision (3 cells in series)

9h 35 am – 60 charge
45 " 60 "
45 – 5.52 discharge
10 64
20 53
30 47 "
40 44
50 41
1.) 46' – 00 39
15 36
30 34
41 32
2.) 47' – 00 30
15 28
30 26
3.) 48' – 00 22
30 20
4.) 49' – 00 18
30 17
5.) 50' – 00 16
30 15
6.) 51' 00 14
30 13
7.) 52' 00 13 "
30 12
8.) 53' 00 12
30 12
9.) 54' 00 11
10.) 55' 00 11
11.) 56 00 10
13.) 58 00 8
14.) 59 00 5 "

3rd charge

10h 05' 00" 60 charge
15' 00" 60 "
16' – 6.80 discharge
10 55
20 42
30 38
40 36
50 35
1.) 16' – 00 34
15 34
30 32
45 30
27
2.) 17' – 00 25
15 23
30 22
45 21
3.) 18' – 00 20
15 19
30 18
4.) 19' – 00 17
30 16
5.) 20' – 00 16
6.) 21' 00 14
7.) 22' 00 13
8.) 23' 00 12
9.) 24' 00 11
10.) 25' 00 10
11.) 26' 00 8
12.) 27' 00 7
13.) 28' 30 5
– 00 4
14.) 29' 00 3

4th charge

10h 37' 00" – 60 charge
40 00 – 60 "
40 – 4.95 discharge
10 72
20 40
30 37 "
40 35
50 32
1.) 49' – 00 30
15 27
30 24
41 21
2.) 50' – 00 19
15 19
30 18
3.) 51' – 00 16
30 15
4.) 52' 00 14
30 13
5.) 53' 00 13
30 12
6.) 54' 00 11
7.) 55' 00 10
8.) 56' 00 9
9.) 57' 00 9
10.) 58' 00 8
11.) 59' 00 8
12.) 00 00 7
13.) 01 00 6
14.) 02' 00 4
30 3

5th charge

11h 35' 00" – 60 charge
45' 00" – 60 "
45 – 6.90 discharge
10 70
20 40
30 35
40 32
50 29
1.) 46' – 00 26
15 21
30 17
45 15
2.) 47' – 00 15
15 14
30 13
3.) 48' – 00 12
30 12
4.) 49' 00 11
30 11
5.) 50' 00 10
6.) 51' 00 10
7.) 52' 00 9
8.) 53' 00 9
9.) 54' 00 8
10.) 55' 00 7
11.) 56' 00 5
12.) 57' 00 3

#41 – 6th charge –

1h 49' 00" – 60 charge
57' 00 – 60 "
59' – 5.100 discharge
10 – 68
20 – 48 "
30 – 35
40 – 30
50 – 26
1) – 00 – 60 – 23
15 – 19
30 – 16
45 – 14
2) – 01 – 60 – 11
15 – 10
30 – 9
3) – 02 – 60 – 9
30 – 9
4) 03' – 00 – 8
30 – 8
5) 04' – 00 – 8
30 – 8
6) 05' – 00 – 8
7) 06' – 00 – 8
8) 07' – 00 – 7
9) 08' – 00 – 7
10) 09' – 00 – 6
11) 10 – 00 – 5
30 – 3

7th charge

2h 21' 00" – 60 charge
31' 00" – 60 "
31' – 6.90 discharge
10 – 67
20 – 43 "
30 – 36
40 – 32
50 – 28
1) – 32' – 00 – 25
15 – 21
30 – 18
45 – 15
2) 33 – 00 – 14
15 – 13
30 – 13
3) 34' – 00 – 12
30 – 12
4) 35' – 00 – 12
30 – 11
5) 36 – 00 – 11
30 – 10
6) 37' – 00 – 10
30 – 9
7) 38' – 00 – 8
30 – 8
8) 39 – 00 – 7
9) 40 – 00 – 6
10) 41' 00 – 4
30 – 3

#41 – 8th charge.

3h 38' 00" – 60 charge
48' 00" – 60 "
48 – 5.87 discharge
10 – 79
20 – 62 "
30 – 47
40 – 33
50 – 30
1) 49 – 00 – 27
15 – 23
30 – 19
45 – 16
2) 50 – 00 – 13
15 – 11
3) 51 – 00 – 9
15 – 8
30 – 8
4) 52' – 00 – 8
30 – 8
5) 53 – 00 – 7
30 – 7
6) 54' – 00 – 7
30 – 6
7) 55' – 00 – 6
8) 56' – 00 – 6
30 – 5
9) 57' 00 – 4
10 58 00 – 3
15 – 3

#41 – 9th charge

4h 09' 00" – 60 charge
19' 00" – 60 "
19' – 6.90 discharge
10 – 77
20 – 46 "
30 – 35
40 – 32
50 – 27
1) 20' – 00 – 23
15 – 19
30 – 16
45 – 14
2) 21 – 00 – 12
15 – 12
30 – 11
3) 22 – 00 – 11
30 – 11
4) 23 – 00 – 10
30 – 10
5) 24' – 00 – 10
6) 25' – 00 – 9
7) 26' – 00 – 8
8) 27' – 00 – 7
30 – 6
9) 28 – 00" – 5
30 – 5
10) 29' – 00" – 4

#41 - 11th charge

9h 12' 00" - 60 charge
22' 00" - 60 "
32' - 00 - 120 discharge
10 - 84
20 - 58
30 - 42
40 - 37
50 - 34
1) 23' - 00 - 30
15 - 25
30 - 20
45 - 15
2) 24' - 00 - 13
15 - 12
30 - 11
3) 25' - 00 - 10
30 - 8
4) 26' - 00 - 7
30 - 6
5) 27' - 00 - 6
30 - 6
6) 28' - 00 - 5
30 - 5
7) 29' - 00 - 5
8) 30' 00 - 4
9) 31' - 00 - 3

3rd series Amo.

12th charge

3h 12' 00" - 60 charge
20' 00" - 60 "
22' - 00 - 120 discharge
10 - 76
20 - 58
30 - 44
40 - 38
50 - 34
1) 23' - 00 - 28
15 - 22
30 - 19
45 - 16
2) 24' - 00 - 14
15 - 12
30 - 11
3) 25' - 00 - 9
30 - 9
4) 26' - 00 - 8
30 - 7
5) 27' 00 - 7
30 - 7
6) 28' - 00 - 6
30 - 6
7) 29' - 00 - 6
30 - 5
8) 30' 00 - 5
9) 31' 00 - 4

13th charge

3h 35' 00" - 60 charge
45' 00" - 60 "
45' - 00 - 120 disch.
10 - 90
20 - 62
30 - 46
40 - 37
50 - 32
1) 46' - 00 - 28
15 - 23
30 - 18
45 - 16
2) 47' - 00 - 14
15 - 13
30 - 12
3) 48' 00 - 11
30 - 10
4) 49' 00 - 10
30 - 9
5) 50' 00 - 8
6) 51' 00" - 7
7) 52' - 00 - 7
8) 53' - 00 - 6
9) 54' - 00 - 5

14th charge

4h 06' 00" - 60 charge
16' 00 - 60 "
16' - 00 - 120 disch.
10 - 50
20 - 53
30 - 43
40 - 32
50 - 28
1) 17' - 00 - 25
15 - 21
30 - 18
45 - 16
2) 18' - 00 - 15
15 - 14
30 - 14
3) 19' 00 - 13
30 - 12
4) 20' 00 - 11
30 - 10
5) 21' 00 - 10
30 - 9
6) 22' 00 - 8
7) 23' 00 - 7
8) 24' 00 - 6
9) 25' 00 - 6
10) 26' 00 - 5

4th June 1885.

#3 – Red fluid — Silver & Silver

Cell	Time	Deflection	Remarks
2° left & fl	2h 30' P.M.	-60 charge	No gas given off.
	40' 00"	-60 "	Plates coated with
	40' -- 5"	1 discharge	a brilliant red
	10	-1 "	but scaly substance
	20	0	
	30		
	40		

#4 – Nitroprusside of soda.

Cell	Time	Deflection	Remarks
not primary	2h 50' 00"	60 charge	Internal resist of cell increased rapidly with charge – 4 battery cells put in series.
	53' 00"	40 "	
	3h 00' 00"	32 "	
	00' -- 9"	17 disch.	
	10	16	Positive – gray coating easily scraped off.
	20	15 "	
	30	12	
	40	8	
	50	6	
	01' 00	4	
	15	4	
	30	3	
	45	3	

60 divisions on 3/10 ohm coil of galvanometer correspond to .0018 × 60 = 0.1 amperes

#5 – Nitroprussid. of Na & Pt. ac. sol.

Cell	Time	Deflects	Remarks
not primary	3h 13' 00"	60 charge	Grayish coating as before.
	15' 00"	50 "	
	17' 00"	35 "	
	23' 00"	26 "	
	23' -- 4"	14 disch.	
	10	5 "	
	20	2	
	30	1 "	

#6 – Uranium sulphate

Cell	Time	Deflects	Remarks
not primary	3h 36' 00"	40 charge	Gas formed freely. Pinkish ppt formed. Solution becomes opaque.
	36' 00"	60 "	
	36' -- 5"	110 disch.	Both plates blackened on discharge.
	10	27	
	20	19	
	30	17 "	
	40	14	
	50	13	
1.)	37' -- 00	12	
	15	11	
	30	10	
2.)	38' -- 00	8	
	30	7	
3.)	39' 00	6	
	30	5	
4.)	40' 00	4	

#7 - Manganese chloride — ag & ag

not priming — 3h 42' 00" — 60 charge — Gas given off lightly.
52' 00" — 60 ,,
52' — —
10" — 150 disch
20 — 80
30 — 20
40 — 12
50 — 8
53 — 00 — 6
15 — 4
30 — 4

#8 - Phosph. acid

not priming — 4h 07' 00" — 60 ch — White cloud immediately formed. Plates blackened.
17' 00" — 60 ,,
17 — — & 150 disch
10 — 25
20 — 9
30 — 3
40 — 2
50 — 1
60 — 1

#10. Phosph. ac. blac. — ag. & ag.

not priming — 4h 21' 00" — 60 charge — White cloudy ppt. formed. Plates blackened.
31' 00" — 60 ,,
31 — —
10 — 150 disch
20 — 52
30 — 28
40 — 19
50 — 15
1.) 32 — 00 — 12
15 — 11
30 — 10
45 — 9
2.) 33 — 00 — 8
30 — 7
3.) 34 — 00 — 6
30 — 6
4.) 35' 00 — 5
30 — 5
5.) 36 — 00 — 5
30 — 4

#11 - Copper aq. Mangan & Ph. ac. Sl. — ag. & ag.

Not primary	4^h 47' 00"	60 charge	
	57' 00"	60 "	Greenish white coating on positive plate.
	57 — 3	18 disch	
	10	2	
	20	1	
	30	1	
	40	—	

#14 - Ferric-cyanide

Not primary	5^h 00' 00"	60 charge	
	10' 00"	60 "	White p.p. forms
	10	—	
	10		
	20	150 disch	
	30	120	
	40	76 "	
	50	52	
11'	00	42	
	15	30	
	30	20	
	45	16	
12'	00	12	
	15	9	
	30	8	
13'	00	6	
	30	4	

#15 - Boracic acid — ag. & ag.

Not primary	5^h 17' 00"	60 charge	White cloudy precip. forms
Resist. lowered with charge	27 00"	60 "	
	27 — 7	7 disch	
	10	5	
	20	4	
	30	4	
	40	3	
	50	2	
	00	—	

Friday, 5th June 1905

16 Strontium Carb & Glac. ac. | Silver & Silver

not passing	9^h	22' 00" – 60 charge	White cloudy precipitate immediately formed
		32' 00" – 60 "	
		32 – – 6 – 10 disch	Black stain on coating on plates,
		10 – 9	
		20 – 5 "	
		30 – 3	
		40 – 2	
		50 – 1 "	

18 – Phosphate of Soda.

nothing	9^h	38' 00" – 60 charge	Gas given off lightly.
		48' 00" – 60 "	
		45' – – 3 – 10 disch	
		15 – 5	
		20 – 3	
		30 – 2	
		40 – 1	

19 – Sulphide of Soda

nothing 4 battery cells in series	9^h	59' 00" – 60 ch	Gas given off lightly Faint cloud formed.
	10^h	01 – 00" – 60 "	
		07 – 00" – 25	
		09 – 00" – 22 "	
		09' – – 6 – 9	
		10 – 7	
		20 – 4	
		30 – 3	
		40 – 2	

20 – Acetic Acid.

nothing	– 10^h	13' 00" – 60 ch.	Plates darkened.
		14' 00" – 60 "	Heavy fine p.p. formed
		30" – 10 "	
		23 – 00 – 7 "	
		23 – – 6 – 50 disch	
		10 – 75 "	
		20 – 55	
		30 – 35	
		40 – 26 "	
		50 – 20 "	
	1.)	24 – 00 – 14	
		15 – 10	
		30 – 7	
		45 – 5 "	
		00 – 3	

21 – Phosp ac. Sol. + Acetic ac.

nothing	10^h	27' 00" – 60 charge	Gas given off lightly & a heavy fine cloudy p.p. formed
		37' 00" 60 "	
		37' – 7 – 100 disch	
		10 – 90 "	
		20 – 72	
		30 – 54	
		40 – 38	
		50 – 32	
	1.)	38' – 00 – 25	
		15 – 19	
		30 – 14	
	2.)	39' – 00 – 7 "	
	3.)	40' – 00 – 4	

#23 - arsenious acid   ag + ag

not freezing	10h 55' 00" - 60 ch	Plates immediately stained. Heavy white pp from positive plate. Color changes to black
	59' 00" - 50 "	
	11h 05 00" - 35 "	
	12 - 4 - 7 desch	
	10 - 6	
	20 - 4	
	30 - 4	
	40 - 3	

#24 - Sulph of Iron & Sulph of Zinc

not freezing	11h 15' 00" 60 charge	White pp from positive plate
	25 00" - 60 "	
	25 - 4 - 150 desch	
	10 82	
	20 53	
	30 34	
	40 - 27 "	
	50 - 22	
	1.) 29' - 00" - 15 "	
	30" - 13 "	
	2.) 30' - 00" - 11 "	
	30" - 10 "	
	3.) 31' - 00 - 9 "	
	4.) 32' - 00 - 7 "	
	5.) 33' - 00" - 7 "	
	6.) 34 - 00 - 6 "	

#25 - citric acid   ag & ag

nothing	11h 36' 00" - 60 ch.	Plates stained
	46 00" - 60 "	
	46 - 05 65	
	10 - 60	
	20 - 52	
	30 - 44	
	40 - 35	
	50 - 24	
	47' - 00 - 16	
	15 - 11	
	30 - 9	
	48 - 00 - 7	
	30 - 5	
	00 - 4	

#26 - Sulphates of Iron & Zinc

not freezing	12h 01' 00" - 60 charge	Heavy black precipitate,
	11' 00" - 60 "	
	11' —	
	10	
	20 - 150 desch	
	30 - 80	
	40 45 "	
	50 - 36	
	1.) 12' - 00 - 25	
	15 - 22	
	30 - 15 "	
	2.) 13' - 00 - 11.	
	3.) 14' - 00 - 9	
	4.) 15' 00 - 7 "	
	5.) 16' - 00 - 5	

ag + ag.

#27 – Oxalate of Am. + Ph. ac. Sl.

not prim'y	12h 44' Pull no change	Black cloud formed
	50 .. 60 "	
	54 – 5 70 disch	
	10 – 17	
	20 – 7	
	30 – 4	
	40 – 3	

#28 – Pyro-gallic acid

not prim'y	1h 37' no" – no change	Plates slightly stained
	44' no" 60 "	
	44' – 2 – 6 disch	
	10 – 3	
	20 – 2	
	30 – 1	

#29 – Tannic acid

1° right	1h 52' no" – no change	Frothy mass formed
	2h 02' no" – 60 "	
	02' 3 – 12 disch	
	10 – 9	
	20 – 8	
	30 – 6	
	40 – 4	
	50 – 3	

ag. + ag.

#30 – Tannic acid + Ph. ac. Sl.

2° left	2h 13' no" – no change	Plates blackened
	23' no" – 60 "	
	23 – – 2 50 disch	
	10 – 44	
	20 – 19	
	30 – 12	
	40 – 9	
	50 – 8	
	1) 24 – 00 – 8	
	15 – 7	
	30 – 6	
	2) 25 – 00 – 6	
	30 – 5	

#31 – Glycerin + sodium chloride

Nothing	2h 25 no" – 42 ch	Gas from neg. platinum pole
	38 no" – 38 "	
	35 – – disch	
	10 3	
	20 2	
	30 0	

#32 – Glycerine & Sulph. ac. Ag & Ag

nothing	2h	45' 00" – 60 charge	Gas freely from neg. pl.
		55' 00" 60 "	
		55 – 6 40 disch	Whitish pp formed
		10 – 52	
		20 – 23 "	
		30 – 18	
		40 – 13	
		50 – 11	
		56 – 00 – 10 "	
		15 – 8	
		30 – 7	
		00 – 6	

#33 – Glycerine & Ph. ac. S.C.

nothing	3h	01' 00" – 60 ch	Gas freely given off
		03 00" – 56 "	
		11 00" –	
		11 – 45	
		10 – 4	
		20 – 3	
		30 – 2	
		40 – 1	

#34 – Oxalic acid Ag & Ag

nothing	3h	32' 00" – 60 ch	Plates blacken
		32 00" 60 "	
		32 – 7 150 disch	
		10 110	
		20 – 74	
		30 – 60	
		40 – 38	
		50 – 33	
		33' – 00 – 27	
		15 – 10	
		30 – 7	
		45 – 5	

#35 – Oxalic acid & Phosp. ac. S.C.

nothing	3h	36' 00" – 60 charge	Brown pp formed
		46 00" 60 "	
		46 – – disch	
		10 – 150	
		20 – 30	
		30 – 18	
		40 – 12	
		50 – 10	
		47' – 00 – 9	
		15 – 8	
		30 – 6	
		45 – 6	
		48 00 – 5	

 #36 – Iodic acid ag. & ag.

nothing	4h 27' 00"	60 charge	Light pp.
	37' 00"	60 "	
	37 -- 5	76 disch	
	10	58	
	20	41 "	
	30	20	
	40	14 "	
	50	11	
b)	38' -- 00	10	
	15	9	
	30	8	
	45	7 "	
b)	39 -- 00	6	

#37 – Iodic acid 9 H. ac. Sl.

nothing	4h 41' 00"	60 charge	white cloudy precip.
	51' 00"	60 "	
	51' -- 5	90 disch.	
	10	85	
	20	54 "	
	30	24	
	40	14	
	50	11	
	52' -- 00	9 "	
	15	7	
	30	6	
	45	5	
	53' -- 00	5 "	

#38 alum ag. & ag.

nothing	5h 16' 00"	60 charge	Grey coating on plates
	26' 00"	60 "	
	26 ---	disch	
	10	50	
	20	35 "	
	30	20	
	40	14	
	50	11	
b)	27 - 00	10 "	
	15	8	
	30	7	
	45	5	
	00	4	

Saturday 6th June '08

#39 – alum & Ph. ac. — ag & ag

Act	Time		Defl.	Remarks
not fuming	9h	11' 00"	60 charge	White pp.
		31' 00"	60 "	
		31' --	450 disch	Plates slightly blackened
		10	86	
		20	56 "	
		30	43	
		40	37 "	
		50	33	
	1.)	32' 00	31 "	
		15	26	
		30	23	
		45	20 "	
	2.)	33' 00	18	
		30	15 "	
	3.)	34 00	12 "	
		30	10	
	4.)	35' 00	8	
		30	7 "	
	5.)	36 00	6	
		30	5	
	6.)	37' 00	4 "	
		30	4	
	7.)	38' 00	3	

#40 – alum & uranium sulph. ag & ag

nothing	9h	39' 00"	60 charge	Plates blackened
		49' 00"	60 "	White pp.
		49 --		
		10	145 disch	Gas given off slightly
		20	28	
		30	14 "	
		40	10	
		50	8	
		00	6	
		15	4	

#42 – Arseniate of uranium & zinc sulph.

1° left.	10h	13' 00"	60 charge	Heavy fine white pp. falls immediately.
		13' 00"	60 "	
		13 --	disch	
		13	150	
		20	105 "	
		30	84 "	
		40	65	
		50	56 "	12) 25 00" 7
	1.)	14' 00	48	14) 27 00" 5
		15	42 "	17) 30 00" 4
		30	37	
	2.)	15' 00	28	
		30	22	
	3.)	16' 00	17	
	4.)	17' 00	14	
	5.)	18' 00	12	
	6.)	19 00"	11	
	8.)	21 00"	10	
	10.)	24 00"	8	

Ag x ag.

44 – Barium Chloride

Nothing – 10h 34' 00" – 60 charge
44' 00" – 60 "
44 – 3 – 12 disch
10 – 3 "
20 – 1
30 – 0

Plates stained, Gas slightly given off.

45 – Barium Manganese Chlorides

Nothing 10h 46' 00" – 60 charge
56 – 00" – 60 "
56 – – disch
10 –
20 –
30 –
40" –
50 – 150
1) 57' – 00 – 75
15 – 28
30 – 11
45 – 8
58 – 00 – 6
15 – 4
30 – 4

Plates immediately blackened

Ag x ag

46 – Sulph. of Uranium

1° right

11h 09' 00" – 60 charge
19 00" – 60 "
19' – – 10" – 140 disch
20 64
30 35 "
40 – 28
50 – 23 "
1) 20' – 00 – 19
15 – 16 "
30 – 14
2.) 21' – 00 – 11 "
30 – 9
3.) 22' 00 – 8
30 – 7
4) 23' 00 – 6

Black deposit

30 – Carbonate of Potassium.

Nothing

4h 25' 00" – 60 charge
35' 00" – 60 "
35 – 3 – 10 disch
10 – 4
20 – 2
30 – 1
40 – 1
50 1

White pp.

#57 – Bicarbonate of Potassium. ag + ag

Nothing	11h 37' 00" – 60 charge	Gas lightly given off
	47' 00" – 60 "	
	47 – – 4 11 disch	
	10 – 6	
	20 – 4	
	30 – 3	
	40 – 2	

#52 – Sulphate of Potass.

Nothing	11h 49' 00" – 60 charge	Gas freely given off
	59' 00" – 60 "	
	59' – – 7 31 disch	Brown deposit
	10 – 26	does not fall
	20 – 19 "	at first
	30 – 12	
	40 – 11	
	50 – 11	
1.)	00' – 00" – 11	
	15 – 10	
	30 – 9	
2.)	01' – 00 – 8	
	30 – 7	
3.)	02' – 00 – 6	
	30 – 5	
4.)	03 – 00 – 4	

#53 – Bisulphite of Potass. ag + ag

Nothing	12h 09' 00" – 60 charge	White precip.
	19' 00" – 60 "	
	19' – – 6 35 disch	Plates stained
	10 – 65	
	20 – 37 "	
	30 – 20	
	40 – 14	
	50 – 11	
1.)	20' – 00 – 10	
	15 – 8	
	30 – 7 "	
2.)	21 – 00 – 6	
	30 – 6	

#54 – Bromide of Potass.

Nothing	12h 23' 00" – 60 charge	Plates blacken immediately
	33' 00" – 60 "	
	33 – – 3 4 disch	
	10 – 3	
	20 – 2	
	30 – 1	
	40 – 0	

 #55 — Permanganate of Potass. ag & ag

Not priming	12h 36' 00" — 60 charge	
	46' 00" — 60 "	Black deposit
	46' — 2' 41 disch	
	10 — 26	
	20 — 20 "	
	30 — 17	
	40 — 15 "	
	50 — 13	
	1) 47' — 00 — 12	
	15 — 10 "	
	30 — 9	
	2) 48' — 00 — 8	
	30 — 6 "	
	3) 49' 00 — 5	

#56 — Sulpho-cyanide of Potass.

Nothing	12h 51' 00" — 60 charge	
	1h 01' 00" — 60 "	No gas given off.
	01' — 3' 20 disch	
	10 — 8	
	20 — 5	
	30 — 2	
	40 — 1	
	50 — 0	

#57 — Ferro-cyanide of Potass. — ag & ag

Nothing	1h 04' 00" — 60 charge	
	14' 00" — 60 "	Gas passing freely from neg plate
	14' — 5" 6 disch	
	10 — 3	
	20 — 1 "	
	30 — 0	

#58 — Hypo sulphate of Potass.

Nothing	1h 16' 00" — 60 charge	Black cloudy precipitate
	26' 00" — 60 "	
	26' — 4' 50 disch	
	10 — 37	
	20 — 16 "	
	30 — 8	
	40 — 4	
	50 — 2	

#59 — Arseniate of Potass.

Nothing	1h 25' 00" — 60 charge	Brown coating on positive plate
	35' 00" — 60 "	
	35' — 3' 24 disch	
	10 — 11 "	
	20 — 7	
	30 — 4	
	40 — 2	
	50 — 1	

 #60 - arsenide of Potass & Ph. [illegible]

nothing	1h 45' 00" - 60 charge		Plates immediately blackened. Gas freely given in neg. pl.
	55' 00" - 60 "		
	55' - - 3 - 20 disch		
	10 - 16		
	20 - 12		
	30 - 10		
	40 - 9		
	50 - 8		
1)	56' - 00 - 7		
	15 - 5		
	30 - 4		
2)	57' 00 - 3		

#2 - Red Fluid with plates of Nickle.

Cell	Time	Defl.	Remarks
5° left.	9h 43' am - 60 charge		Green precipitate appears to be formed.
	53 00" - 60 "		
	53 - - 3 - 4 discharge		
	10 - 4		
	20 - 4		
	30 - 3		
	40 - 3		

#4 - Nitro-prusside of Sodium.

nothing	9h 59' 00" - 60 charge		Yellow spongy deposit on positive plate.
	10h 07' 00" - " "		
	07 - - 2 - 9 disch		
	10 - 4		
	20 - 2		
	30 1		

#5 - Nitro-prusside of Na & Pt. ac. [illegible]

nothing	10h 09' 00" - 60 charge		Same precip. as in previous test.
	19' 00" - 60 "		
	19' - 4" - 4 disch		
	10 - 3		
	20 - 1		
	30 - 0		

#3 – Hyposulphite of Soda. Ni & Ni

Nothing	10h 23' on – 60 charge		Plates blackened
	33' on – 60 "		Black precipitate
	33 – 5	12 desch.	
	10	7	
	20	3	
	30	2	
	40	1	

#1 – Sodium Sulphate.

Nothing	10h 35' on – 60 ch		Gas freely from both plates,
	45' on – 60 "		
	45' – 3	4 desch	
	10	0	
	20	0	
	30		

#6 – Manganese Sulphate.

Nothing	10h 53 on – 60 ch,		
	11h 03 on – 60 "		
	03 – 5	25 desch	Black stain on negative pl. after discharge,
	10	15 "	
	20	10 "	
	30	7	
	40	5	
	50	4	
	00' – 00	4	
	15	3	

#7 – Manganese Chloride Ni & Ni

Nothing	11h 13' on – 60 charge		Gas from negative plate
	33' on – 60 "		Black flaky precip.
	33' – 7	19 desch	
	10	17	
	20	9 "	
	30	7 "	
	40	5 "	
	50	4	
	00	4	
	15	3	

#8 Phosph. ac.

1° left	11h 30' on – 60 charge		Solution turns a greenish color. Black coloration on plates,
	40' on – 60 "		
	40 – 6	4 desch	
	10	1	
	20	– 4 left	
	30	– 6	
	40	– 5	
	50	– 4	
	00	– 3	
	15	– 3	
	30	– 2	

#9 "B" Mang. & Zinc Sulphate. Zn & Zn

Nothing	11h 44' 00"	60 charge	very little gas given off.
	54' 00"	60 "	
	54 - - 6	26 disch	
	10	41	
	20	32 "	
	30	29	
	40	28 "	
	50	28	
	1.) 55' - 00	27	
	15	26	
	20	25	
	45	24	
	2.) 56' 00	23	
	30	22	
	3.) 57 . 00"	22	
	4.) 58' - 00"	21	
	5.) 59' 00"	20	
	12h 60' - 00"	19	
	7.) 01 - - 00"	19	
	8.) 02' - - 00"	18	
	11) 05 = 00"	15	
	15) 09 - 00"	5	

#10 - Glacial Phosp. ac. Zn & Zn

1° right	12h 23' 00"	60 charge	White cloudy precipitate
	33' 00"	60 "	
	33' - 4	16 disch	
	10	7	
	20	5	
	30	3	
	40	2	

#11 - Hypsum. Manganese & Ph. ac. Zn.

Nothing	12 41' 00"	60 charge	Greenish deposit on plates.
	51' 00"	30 "	
	51 - - 3	40 disch	
	10	16	
	20	6	
	30	4	
	40	3	

#14 Zinc Cyanide

Nothing	2h 07' 00"	60 charge	Gas freely from both plates.
	17' 00"	60 "	
	17 - - 5	25 disch	
	10	17	
	20	15	
	30	15	
	40	15	
	1.) 18 - - 00	15	
	00	12	
	30	11	
	2.) 19 - 00	7	
	3.) 20 - 00	3	

 # 15 – Boracic acid

Ni & Ni

Nothing	2^h 23' 00" – 50 charge		Gas from neg. plate.
	33' 00" – 50 "		
	33 – – 3.4 disch		
	10 – 3		
	20 – 3		
	30 – 2		

16 – Mag. chloride & Ph. ac. Gl.

1° reject	2^h 35' – 00" – 60 charge		Gas from neg. plate.
	45' – 00" – 60 "		
	45 – – – 6 – 14 discharge		
	10 – 5		
	20 – 3		
	30 – 1		

18 – Phosphate of Soda

Nothing	2^h 54' 00" – – 60 charge		Gas freely from both plates.
	3^h 04' 00" – 60 "		
	04' – – 3.5 disch		
	10 – 3		
	20 – 1		
	30 – 0		

Ni & Ni

19 – Acetate of Soda

Nothing – –	3^h 06' 00" – 60 charge		very little action
	16 00" – 60 "		
	16 – – 4 – 20 disch		
	10 – 7		
	20 4		
	30 – 2		
	40 – 1		

20 – acetic acid

Nothing	3^h 22' 00" – 60 charge		Gas freely from neg. plate.
	32' 00" – 60 "		
	32 – – – disch		
	10 – 1		
	20 – 1 "		
	30 – 0		

21 – acetic ac. & Ph. ac. Gl.

Nothing	3^h 37' 00" – 60 charge		Plates stained black
	47 – – 00" – 60		
	47 – – 5" – 40 disch		
	10 – 22		
	20 – 7 "		
	30 – 5		
	40 – 5		
	50 – 4		
	48' – 00" – 3		

23 – Arsenious acid   [illegible]

Nothing	3h 51' av" – 53 charge 4h 01 av" – 48 " 01 – 3 4 disch 10 3 20 2 30 2 40 1 "	Gas given off quickly

24 – Zinc & Ammon sulphates

Nothing	4h 03' av" – 60 charge 13' av" – 60 " 13' – 54 disch 10 30 20 35 " 30 34 40 34 1.) 14' – 00 – 33 30 – 33 2.) 15' – 00 – 32 30 – 32 3.) 16' – 00 – 31 " 30 – 31 4.) 17' 00 – 30 30 – 29 5.) 18' 00 – 27 30 – 24 6.) 19' – 00 – 20 7.) 20 – 00 – 11 30 – 6 8.) 21 – 00 – 3	Plates darkened

25 – Citric acid   [illegible]

Nothing	4h 25' av" – 60 charge 35' av" – 60 " 35' – 11 disch 10 – 9 20 – 7 " 30 – 6 40 – 6 50 – 5 36' – 00 – 5 " 15 – 5 30 – 4	very little action

26 – Sulphates of Ammon + Zinc

Nothing	4h 38' av" – 60 charge 48' av" – 60 " 48 – 5 60 disch. 10 – 36 20 – 32 " 30 – 29 40 – 27 50 – 25 1.) 49 – 00 – 24 15 – 22 30 – 21 2.) 50' – 00 – 20 3.) 51' 00 – 19 4.) 52' 00 – 18 5.) 53' 00 – 17 [illegible] 56 00 – 15 11.) 59 av" – 13 12.) 01 – av" – 12	Gray deposit on plates,

Ri & Ri

#27 – Acetate of Am. & Ph. ac. Gl.

nothing | 5h 02' 00" – 60 charge
12' 00" – 60 "
12' – 3 – 18 disch. | Gas lightly from negative plate.
10 – 9
20 – 4 "
30 – 3
40 – 2

#28 – Pyro-gallic acid

nothing | 5h 14' 00" – 53 charge
19' 00 – 50 "
24 00 – 45 "
24 – 2 – 45 disch
10 – 3
20 – 2 "
30 – 2 "
40 – 1

#29 – Tannic acid

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Ri & Ri

1° left. | 9h 08' 00" – 50 charge
18 00" – 40 "
18' – 3 – 7 disch. | Gas given off lightly
10 – 4
20 – 2
30 – 2.
40 – 1

#30 – Tannic acid & Ph. ac. Gl.

2° right | 9h 24' 00" – 60 charge
34' 00 – 60 "
34' – 4 – 14 disch | negative plate blackened.
10 – 11
20 – 9 "
30 – 8
40 – 6 "
50 – 4
44 – 00 – 4 "
15 – 3
30 – 3

#31 – Glycerin & Salt (NaCl)

nothing | 9h 43' 00" – 25 charge
53 00" – 13 "
53 – – – disch | Gas from negative plate.
10 – 2
20 – 1 "
30 – 0 "

#32 - Glycerine & Sulphuric acid

mi & mi

1° right	9^h 56' 00" – 60 charge	Gas from
	10^h 06' 00" – 60 "	negative plate
	06 — — 10 – 2 disch.	
	20 – 1	

#34 – Oxalic acid

nothing	10^h 21' 00" – 60 charge	Gas lightly
	31' 00" – "	from (+)
	31 – – 6 14 disch	
	10 – 7	
	20 – 3	

#33 – Glycerine & Ph. ac. Sl.

nothing	10^h 35' 00" – 50 ch	
	45' 00" 50 "	
	45 – – 3 – 9 disch	
	10 – 2	
	20 – 1	
	30 – 1	
	40 – 0	

#35 – Oxalic ac & Ph. ac. Sl.

mi & mi

nothing	10^h 55' 00" – 60 charge	Plates blackened
	11^h 05 00" – 60 "	immediately
	05 – – 4 – 24 disch	
	10 – 22	
	20 – 22	
	30 – 22	
	40 – 23	
	50 – 24	
1)	06 – 00 – 24	
	15 – 23	
	30 – 22	
2)	07' – 00 – 20	
	30 – 17	
	45 – 12	
3)	08' 00 – 8	
	15 – 4	
	30 – 2	

#36 – Tartaric acid

nothing	11^h 10' 00" – 60 charge	
	20' 00" – 60 "	Grayish color
	20 – – 3 + 3	ation on neg.
	10 – 8	plate after
	20 – 6	discharge
	30 – 5	
	40 – 5	
	50 – 4	

#37 – Uranic ac. + Ph. ac. Sl. — Ni & Ni

1° right

11h 24' 00" – 60 charge
34 00" – 60 "
34 – 4 24 disch
10 – 14
20 – 7
30 – 6
40 – 5
50 – 5
35' 00 – 4

#38 – alum.

nothing

11h 37' 00" – 60 charge
47 00" – 60 "
47' – 6 12 disch
10 – 11
20 – 8
30 – 6
40 – 5
50 – 4

Plates blackened

#39 – alum + Ph. ac. Sl.

nothing

11h 50' 00" – 60 charge
12' 00 [illegible] – 60 "
00' – 5 26 disch
10 – 20
20 – 12
30 – 9
40 – 7
50 – 5
01' 00 – 4

Both plates streaks

#40 – alum & [illegible] sulph — Ni & Ni

nothing

12h 03' 00" – 60 charge
13' 00" – 60 "
13' – 5 – 21 disch
10 – 29
20 – 14
30 – 10
40 – 8
50 – 7
14' – 00 – 6
15 – 5
30 – 5

Negatives plate black
Positive brown,

#43 – [illegible] & [illegible] sulph.

nothing

12h 16' 00" – 60 charge
26 00" "
26 – 3 50 disch
10 – 27
20 – 17
30 – 12
40 – 11
50 – 10
1.) 27' – 00 – 10
15 – 9
30 – 9
2.) 28' – 00 – 8
3.) 29' 00 – 8
4.) 30' 00 – 7
5.) 31 00 – 6

Plates blackened

Mr Mi

#44 - Barium Chloride

nothing	12^h	35' av" - 60 ch.	
		45 av" - 30 "	Gas lightly
		45 - - 3 - 7 desch	given off
		10 - 3	
		30 - 2	
		30 - 1	

#45 - Barium Chl. & Manganese Chl.

nothing	2^h	02' av" - 60 charge	
		12' av" - 60 "	very little
		12 - - 3 - 44 desch	gas given off
		10 - 19	
		20 - 11	faint precip.
		30 - 7	
		40 - 5	
		50 - 4	

#46 - Sulphate of Iron

nothing	2^h	15' av" - 60 charge	
		25' av" - 60 "	
		28' - - 6 - 105	30' - 15 - 11
		10 - 60	30 - 9
		20 - 44	31' av - 8
		30 - 34	30 - 8
		40 - 28	32' av - 7
		29' 50 - 19	30 - 6
		av - 17	
		15 - 16	
		30 - 15	
		30' av - 12	

#50 - Carbonate of Potass

nothing.	3^h	35' av" - 60 charge	
		45' av" - 60 "	
		45 - - 3 - 20 desch	
		10 - 6	
		20 - 3	
		30 - 1	
		40 - 1	

#51 - Bicarbonate of Potass.

nothing.	3^h	15' av" - 60 charge	Greenwhite
		25 av" - 60 "	deposit on
		25 - - 2 - 7 desch	platinum plate
		10 - 3	- flaky
		20 - 2	
		30 - 1	

#52 - Sulphate of Potass.

nothing	4^h	41' av" - 60 charge	
		51 av" - 60 " desch	
		51 - - - 3 - 14	
		10 - 8	"
		20 - 4	
		30 - 3	
		40 - 3	
		50 - 2	

Wednesday, 10th June '85
Ui & Ui

#53 – Bi-sulphate of Potass.

2° right	9h 19' 00" – 60 charge	Gas freely from neg. lower plate.
	29' 00" – 60 "	
	29' – 5" 2 discharge	
	10 – 2	
	20 – 1	
	30 – 1	
	40 – 0	

#54 – Bromide of Potass.

Nothing	9h 36' 00" – 60 charge	Positive pl. black. Neg. pl. gives off gas.
	46 – 00 – 60 "	
	46 – 4" 14 disch.	
	10 – 4	
	20 – 2 "	

#55 – Permanganate of Potass.

Nothing	9h 52' 00" – 60 charge	
	10h 02 00" 60 "	
	02 – 3 17 disch.	
	10 – 8	
	20 – 4 "	
	30 – 2	
	40 – 1	

#56 – Sulpho-cyanide of Potass.

Nothing	10h 05' 00" – 60 charge
	15' 00" – 60 "
	15 – 3 – 14 disch.
	10 – 6
	20 – 1
	30 – 1

#57 – Ferro-cyanide of Potass.

Nothing	10h 22' 00" – 60 charge	Gas given off briskly from neg. pl.
	32' 00" 60 "	
	32' – 5" 70 disch.	
	10 – 43	
	20 – 25 "	
	30 – 14	
	40 – 10	
	50 – 8	
	33 – 00 – 5	
	15 – 4	
	30 – 2	

#58 – Hyposulphite of Potass.

Nothing	10h 35' 00" – 60 ch.	Black precipitate.
	45 00" – 60 "	
	45 – 5 30 disch.	
	10 – 12	
	20 – 5	
	30 – 4	
	40 – 3	
	50 – 2	

Ni & Ni

59 – Arseniate of Potass.

nothing	10^h 5–8' 00" – 60 charge		Gas freely from both plates
	11^h 0.8' 00" – 60 "		
	08 – –3.9 disch		
	10 – 4		
	20 – 2 "		
	30 – 2		

60 – Arseniate of Potass & Phosp. of Potass.

nothing	11^h 10' 00" – 60 charge		Gas came off rapidly from both plates,
	20' 00" – 60 "		
	20' – –5.7 disch		
	10 – 6		
	20 – 5		
	30 – 4		
	40 – 2		

Zinc & Zinc

1 – Sodium Sulphate.

Cell	Time	Deflection	Remarks
nothing	12^h 01' P.M. – – 60 charge		Gas freely from neg. pl.
	04 – – 60 "		
	11 " – – "		
	11 – – 7.5 disch		
	10 – 4		
	20 – 2		
	30 – 1		

3 – Hyposulphite of Soda

nothing.	2^h 07' 00" – 60 charge		White precip
	17 00" – 60 "		
	7 – – – disch		
	10 – 2		
	20 – 1 "		
	30 – 0		

4 – Nitro-prusside of Soda

nothing	3^h 22' 00" – 60 charge		
	32 00" – "		
	32 ~~–6~~ –3 disch		
	10 – 2		
	20 – 2		
	30 – 2		

Zn + Zn

#5 – Nitro prusside of soda + Ph. ac. Sb

1° left	5h 42' 00" – 60 charge	
	52' 00" – 56 "	Faint precip.
	52 – – – disch	
	10 – 2	
	20 – 2 "	
	30 – 1	

#6 – Manganese sulphate

nothing	3h 02' 00" – 60 charge	Gas freely from neg. plate.
	12' 00" – 60 "	
	12' – – –	
	10 – 1 disch	
	20 – 1	
	30 – 0	

#7 – Manganese chloride.

1° left.	3h 21' 00" – 60 charge	
	31' 00" – 60 "	Heavy black coatings.
	31 – ~~4~~ – 9	Coating falls off
	10 – 9	
	20 – 8	
	30 – 8	
	40 – 8	

Zn + Zn

#8 – Phosphoric acid

nothing	3h 35' 00" – 60 charge	Gas freely from [illegible]
	45' 00" – 60 "	
	45 – – – disch	
	10 – 1	
	20 – 0	

#9 – Manganese & Zinc Sulphates.

nothing.	3h 45' 00" – 60 charge	
	55' 00" – 60 "	
	55 – – – disch	
	10 – 2	
	20 – 1	

#10 – Borax Ph. ac.

nothing	4h 07' 00" – 60 charge	White precip
	17' 00" – 60 "	
	17 – – – disch	
	10 – 2	
	20 – 1	

#11 – Hoffmann. Manganese & Ph. Ac. Sb

nothing	4 20' 00" – 60 charge
	31' 00" – 60 "
	30 – 00 – 10
	30 – – – disch
	10 – 0
	22 – 0

 # 14 - Ferric cyanide   Zn & Zn

nothing. 4h 49' 00" - 60 charge | Gas given off rapidly.
5-9 00" - 60 "
5-9 ---
10 - 0 disch
20 - 0
30 - 0

15 - Boracic acid

5h 02' 00" - 60 charge | Gas freely given off.
12 - 00" - 60 "
12 - - 00" - disch
10 - - 0
20 - 0 "

16 - Manganese Chl. & H. ac. Sl.

4° right 5h 19' 00" 60 right | Hydrogen given off very rapidly before charge.
29' 00" 60 "
29' 0 ---
10 - 9
20 - 8
30 - 8 } firing

18 Phosphate of Soda 11th June. am

nothing 9h 19' 00" - 60 charge | Gas freely from both
29 - - 00 - - 60 "
29 - - 4.6 disch
10 - - 3
20 - 2 . .

19 - acetate of Soda

nothing 9h 40' 00" - 60 charge | Gas freely from neg[illegible]
50' 00 60 "
50 - - 6.10 disch.
[illegible]
20 - 8
30 - [illegible]
40 - [illegible]

20 - acetic acid

nothing 9h 59' 00" - 60 charge | Gas [illegible] freely from both
10h 09 00" - 60 "
09 - ---
10 - 0
20 - 0

#21 acetic ac. & Ph. ac. Sl.

2° right	10h 13' 20" – 60 charge	Gas given off rapidly
	23' 20" – 60 "	Black precip.
	23 – 3 – 9 disch	
	10 – 10	
	20 – 14	
	30 – 14 Primary	

#23 – arsenious acid

Nothing	10h 25' 20" – 60 charge	
	30' 20" 60 "	Very little gas
	35' 20" – 50 "	
	35 – – disch	
	10 2	
	20 1	
	30 0	

#24 – Zinc & Iron sulphates

2° left	10h 59' 20" – 60 charge	
	11h 09 20" – 60 "	
	09 – – disch	
	10 – 2	
	20 – 2	
	30 – 1	
	40 – 1	

#25 – Citric acid

1° left	11h 17' 20" – 60 charge	Gas given off lightly
	27 – 20 – 60 "	
	27 – – 3 – 2 disch	
	10 – 2	
	20 – 1	

#26 – Sulphates of Am. & Zinc

Nothing	11h 34' 20" – 60 charge	Plates blacken
	44 20" – "	
	44 – – 4 – 9	
	10 – 7	
	20 – 5	
	30 – 4	
	40 – 4	

#27 – Acetate of Am. & Ph. ac. Sl.

1° right	11h 47' 20" – 60 charge	Gas given off freely.
	57 20" – 20 "	
	57 – –	
	10 – 1	
	20 – 0	
	30 – 0	

#28 – Pyrogallic acid — Zn & Zn

nothing	12^h 02' 00" – 50 ch.		
	12 00 – 50 "		
	12 – – disch		
	10 – 0		
	20 – 0		

#29 – Tannic acid

nothing	12^h 19' 00" – 50 ch	Gas formed	
	29 00 – 50 "	lightly	
	29 – 52 disch.		
	10 – 1		
	20 – 1		

#30 – Tannic acid + Ph. Ac. Gl.

0 slight –	12 32' 00" – 60 ch	Gas given off	
	42' 00" – 60 "		
	42 – 32 disch		
	10 – 1		
	20 – 1		

#31 – Glycerine & [illegible] chloride

	2^h 12' 00" – 50 charge	Gas freely	
	22 00" – 46 "	from neg. pl.	
	22 – 24 disch		
	10 – 2		
	20 – 1		
	30 – 0		

#32 – Glycerine & Sulph. ac. — Zn & Zn

slight	2^h 25' 00 – 60 charge	H given off	
	35 – 00 – 60 left	after [illegible]	
	35 – 7 20 [illegible]	Gas [illegible]	
	10 – 20 left	[illegible]	
	20 – 22		
	30 – 22	Bubble [illegible]	
	40 – 23	[illegible]	
	50 – 23		
	36 – 00 – 23		
	37 – 00 – 24		
	39 – 00 – 25		
	40 00 – 31		
	45 00 – 36		

Likely as [illegible].

#33 – Glycerine & Ph. Ac. Gl.

nothing	2^h 45' 00" – 60 charge	Gas given off	
	55 00" – 48 "	lightly	
	55 – – disch.		
	10 – 1		
	20 – 0		

#34 – Oxalic acid

nothing	3^h 00' 00" – 60 charge	Plates black-	
	10 – 00 "	ened	
	10 – 3 – 30 "		
	10 – 23 disch.		
	20 – 18		
	30 – 16		
	40 – 13		
	11' 00 – 8		
	15 – 5		
	30 – 2		

 #35 - Oxalic ac. & Ph. ac. Sol. Zn & Zn.

Nothing	3^h	24' 00" - 60 charge	pos. a[illegible]
		34 - 00 - 60 "	[illegible] black-
		34 - - - deckg.	ness
		10 - 4	
		20 - 4	
		30 - 5	
		40 - 6	
		50 - 9	[illegible]

#36 - Tartaric acid.

1° right	3^h	36' 00" - 60 charge	[illegible]
		45 00 - 60 "	[illegible] plate.
		45 - 7 2 deckg.	
		10 - 2	
		20 - 2	
		30 - 1	

#37 - Tartaric ac. & Ph. ac. Sol.

14 1/2° right	3^h 4^h	52' 00" - 60 charge	[illegible]
		02 00 - 60	[illegible] plate.
		02' - 6 70 deckg.	
		10 - 50 right	
		20 - 38	
		30 - 30	
		40 - 18	
		50 - 14	
		03 - 00 - 10	
		15 - 4	
		30 - 3 left	
		40 - 4	

Zn & Zn

#38 - Alum.

2° right	4^h	10' 00" - 60 charge
		20' 00 - 60 "
		20 00 - 7 deckg.
		10 - 6
		20 - 5
		30 - 4

#39 - Alum & Ph. ac.

Nothing	4^h	25' 00" - 60 ch.	pos. [illegible]
		35' 00" - 60 "	[illegible]
		35 - 3 - 3 deckg.	
		10 - 3	
		20 - 2	
		30 - 2	
		40 - 2	

#40 - Alum & Mangan. sulph.

3° left	4^h	35' 00" - 60 ch.
		45 00 - 60 "
		45 4 - 3 deckg.
		10 - 3
		20 - 4
		30 - 5
		40 - 5

Zn & Zn

#43 - arseniate of [illegible]

nothing | 5h 03' 20" - 60 charge | [illegible]
13' 20" - 20 "
13 - 5-6 disch
10 - 5
20 - 5
30 - 4
40 - 3

Friday, 12th June 1885

#44 - Barium chloride | Zinc & Zinc

nothing | 9h 11 20" - 60 charge | Gas [illegible]
21 20" - 20 "
21 - 5-14 disch | Faint precipitate
10 - 6
20 - 4 "
30 - 3
40 - 2
50 - 1

#45 - Barium [illegible] chloride

nothing | 9h 27' 20" - 60 charge | black [illegible]
37' 20" - 20 "
37 - [illegible] disch
10 - 1
20 - 0
30 - 0

#46 - Sulphate of Iron

9h 39' 20" - 60 charge
49 - 20 - 20 "
49 - [illegible] disch
10 - 2
20 - 2
30 - 1

 #50 – Carbonate of Potass. Zn & Zn

nothing	9h 57' 00" – no ch.	Gas rapidly
	10h 07' 00" – 10 "	from both
	07' – 6-18 decly	plates
	10 – 12	
	20 – 8 "	
	30 – 6	
	40 – 4	
	50 – 3	

#51 – Bi-carb. of Potass.

nothing	10h 10' 00" no chg	White flaky prec.
	20 00" – no "	[illegible]
	20 – 4-14 decly	[illegible] plates
	10 – 7	
	20 – 4 "	
	30 – 3	
	40 – 3	

#52 – Sulphite of Potass.

nothing –	10h 25' 00" no charge
	35 00" – no "
	35 – 3-19
	10 – 9
	20 – 3
	30 – 2
	40 – 2
	50 – 1

#53 – Bi-sulphate of Potass. Zn & Zn

5° left	10h 39' 00" – no ch.	Hydrogen given off rapidly
	49 00" – no "	begin to charge
	49 – 22 decly	back [illegible]
	10 – 2	
	20 – 3	Gas given off
	30 – 3	very rapidly
	40 – 3	
	50 – 4	

#54 – Bromide of Potass.

nothing	10h 52' 00" – no charge	Heavy flaky
	11h 00' 00" – no "	deposit on
	00 – 4-31 decly	[illegible] pl.
	10 – 16	
	20 – 6 "	
	30 – 4	
	40 – 3 "	
	50 – 2	

#55 – Permanganate of Potass.

1° right	11h 05' 00" – no charge
	15 00" no "
	15 – 4-13 decl
	10 – 6
	30 – 2

 Zn + Zn

#56 – Sulpho-cyanide of Potass

nothing 11h 18' 00" – 60 chg

20 00" – 60 "

32 – 4.17 dschg

10 – 9

20 – 5 "

30 – 3

40 – 2

#57 – Ferro-cyanide of Potass

nothing 11h 38' 00" – 60 chg

37 00" – 60 "

41' 00" – 42

41 – 4 23 dschg action

10 – 22

20 – 19

30 – 17

40 – 16 "

50 – 12

42' – 00 – 11

15 – 9

30 – 6

43' – 00 – 6

15 – 5 "

#58 – Hypo-sulphite of Potass.

nothing 11h 44' 00" – 60 chge Gas given off

54 00" – 60 "

54 – 3.14 dschg lightly.

10 – 4

20 – 2

30 – 1

40 – 1

Zn + Zn

#59 – arseniate of Potass

1 left 12' 00" – 60 charge Plates black-ened.

10 – – – 60 "

10 – 14 – 5 dsch gas freely

10 – 3

20 – 2 "

30 – 1 "

#60 – arseniate of Potass + Phosph. Potass.

nothing 12h 12' 00" – 60 chge faint cloudy

22' 00" – 60 " precip.

22 – 0 11 dischge Plates black-ened

10 – 4

20 – 2

30 – 0

40 –

#1 - Sodium Tungstate

Cell	Time	Defl.	Remarks
Nothing	2h 14' 00"	- 60 charge	Gas given off lightly.
	34' 00"	- "	
	34	--- 4-12 disch.	
	10	- 8	
	20	- 4	
	30	- 1	
	40	- 0	

#3 - Hyposulphite of Soda.

Nothing	2h 36' 00"	- 60 charge	Brown precip
	46 00"	- 60 "	
	46	-- 4 - 6 disch	
	10	- 2	
	20	- 1	

#4 Nitro-prusside of Soda.

Nothing	2h 51' 00"	60 charge	Green coating on positive pl.
	3h 01 00"	60 "	
	01	-- 3 12 disch.	
	10	- 5	
	20	- 3	
	30	- 2	

#5 - Nitro prusside of Soda + Ph. ac. &

1° left	3h 19' 00"	- 60 charge	Green coating on positive
	19' 00"	- 60 "	
	19'	- 3-10 disch	
	10	- 3	
	20	- 2 "	
	30	- 2	
	40	- 1	

#6 - Manganese sulphate

Nothing	3h 31' 00"	- 60 charge	Brownish ppt.
	31 00"	- 60 "	
	31	--- 0 disch	
	10	- 0	
	20	-	

#7 - Mud

Nothing	3h 54' 00"	- 60 charge	
	04 00"	- 60 "	
	4	- 60	
	10	- 37	
	20	- 20	
	30	- 10	
	40	- 8	
	50	- 6	
	00	- 5	

#8 – Phosph. ac.

Nothing	4h 24' 00" – 60 charge	Black colouring
	34' 00" – 20 "	
	34' – 4 60 disch	
	10 – 21	
	20 – 9 "	
	30 – 7	
	40 – 5 "	

#9 – Mang. & Zinc sulphates

nothing	4h 44' 00" – 60 ch	
	54 00" – 60 "	
	54 00" 150 disch.	Black deposit on plate
	10 – 130	
	20 – 42	
	30 – 21	
	40 – 17	
	50 – 16	
	55' – 00 – 15	
	15 – 13	
	30 – 11	
	56' – 00 – 10	
	30 – 9	
	57' 00 – 8	
	30 – 7	

#10 – Glacial Ph. ac.

nothing.	5h 00' 00" – 60 charge	
	10' 00" – 60	Plates [illegible] coloured
	10' – 5 – 60 disch	
	10 – 24	
	20 – 15	
	30 – 11	
	40 – 9	
	50 – 7	
	60 – 6	

#11 – Hyposulph. of [illegible] + Ph. ac. Sol.

nothing	5h 12' 00" – 60 charge	Black colouration on positive plate
	16' 00" – 60 "	
	24' 00 – 30 "	
	24 – 3 – 21	
	10 – 9	
	20 – 4	
	30 – 2	

Saturday 13th June. Any

#14 – Ferric Cyanide. Brass & Brass

nothing	9h 17' 00"	60 charge	Both plates blackened
	27' 00"	60 "	
	27' – 6	70 discharge	
	10	22	
	20	13 "	
	30	9	
	40	5 "	
	50	3	

#15 – Boracic acid

nothing	9h 31' 00"	50 charge	Gas given off freely. White pp. from positive pl.
	41' 00"	50 "	
	41' – 5	10 discharge	
	10	9	
	20	8	
	30	7	
	40	6	
	50	5	
	42' 00	5	
	15	4	

#16 – Brass & Brass

Mangan ch. & Ph. ac. Sol.

1° left	9h 44' 00"	60 charge	Gas given off slightly
	54' 00"	60 "	
	54' – 5	21 disch.	
	10	14	
	20	10 "	
	30	8	
	40	7 "	
	50	7	
	00	6	

#18 – Phosph. of Soda.

nothing	9h 56' 00"	60 charge	Plates discolored. Blue deposit on positive plate
	10h 06 00"	60 "	
	06 – 2	14 discharge	
	10	2	
	20	1	

#19 – Acetate of Soda.

nothing	10h 08' 00"	60 charge	Faint green precipitate
	18' 00"	60 "	
	18 – 3	30 disch.	
	10	14	
	20	7 "	
	30	4	
	40	2	

 #20 - acetic acid

nothing	10h 23' 00" - 60 charge	Gas freely from neg. plate.
	33 00" - 60 "	
	33 - 2 - 30 disch.	
	10 - 19	
	20 - 17 "	
	30 - 12	
	40 - 8	
	50 - 5	
	34' - 00 - 3	

#21 - acetic ac. & Ph. ac. & C.

nothing	10h 37' 00" 60 charge	Gas freely from neg. plate.
	47 00" "	
	47 - 6 - 90 disch.	
	10 - 54	
	20 - 42 "	
	30 - 29 "	
	40 - 24	
	50 - 14	
	48' - 00 - 9	
	15 - 7	
	30 - 5	
	49' 00 - 2	

#23 - Arsenious acid

nothing	10h 53' 00" - 40 charge	Faint dark precip.
	11h 03' 00" - 40 "	
	03 - 2 - 6 disch.	
	10 - 3	
	20 - 2	

#24 - Iron & Zinc Sulphates,

1° right	11h 07' 00" - 60 charge	Gas very lightly.
	17' 00" - "	
	17 - 7 - 150 disch.	
	10 - 130	
	20 - 82 "	
	30 - 24	
	40 - 18 "	
	50 - 14	
	18' - 00 - 12	
	15 - 11	
	30 - 10	
	19' 00 - 8	
	30 - 7	
	20' - 00 - 6	
	30 - 5	

 #25 – Citric acid   Brass & Brass

1° left	11h 33' 00" – 60 charge		Gas lightly.
	33 00" – 60		
	33 – 4 – 30 disch		
	10 – 28		
	20 – 20	"	
	30 – 9		
	40 – 7		
	50 – 5		

#26 – Sulphate of Ammon & Zinc

nothing	11h 35' 00" – 60 charge		
	45 00" – 60	"	no action
	45 – 4 – 150 disch		
	10 – 54		
	20 – 30		
	30 – 21		
	40 – 17		
	50 – 14		
	46 – 00 – 12		
	15 – 10		
	30 – 9		
	47' 00 – 8		
	30 – 7		
	48' – 00 – 7		
	30 – 6		

Brass & Brass

#27 – Oxalate of Am & Ph. Ac. S.G.

nothing	11h 50' 00" – 60 charge		Gas from neg. plate
	12h 12' 00" –	"	
	12' – 4 – 70 disch.		
	10 – 44		
	20 – 14		
	30 – 7		
	40 – 5		
	50 – 4		

Monday, 15th June

Experiments with Bichromate cells. Zinc & Carbon

Solution Saturated sol. chro. in H_2O .. 17 cc
+ H_2O .. 34 cc
+ HCl .. 17 cc

Time	Deflections	Remarks
11h 31' 00"	80 divs (discharge) = ·14 amperes	Weight of zinc before disch = 25·629 grms
41' 00"	80 left	Wt. after action = 23·677
11h 54' 00"	80 divs right (charge)	Wt after counter charge
12h 04' 00"	80 divs	= 23·5 grms

Second current (from battery) equivalent to 80 divs or 0·28 amperes since it balanced the current from the primary cell

Loss in 1st = 1·952 grms
" " 2nd = 0·177 "
Second loss probably due to local action & there was no deposit.

Bichromate Cell - Zinc & Carbon plates

Saturated solut. of Chromate in HNO_3
+ 1/3 vol H_2SO_4

Time	Defl.	Remarks
2h 46' 00"	80 left	Wt. of zinc before action = 23·5 grms
56' 00"	80	After " = 22·5
3h 02' 00"	80 right	Wt. after counter ch
10' 00"	80 "	= 19·94
		Loss 1st case = 1·00 grm
		" 2nd " = 2·56

Reverse current therefore does not deposit zinc.

Same solution - allowing the cell to run down continuation of Previous tests   Tuesday 16th June, 1885,

22° defl. no extra resistance in circuit
deflection left of zero.
Reverse current from battery
80° defl. right at 9:35 am,
extra resist from 30 ohms to 13 ohms
Battery disconnected at 10h 10' — 35 minutes

Disch			
	110°	at 10h 10' 10"	no extra resist in circuit
	90°	" 30"	" " " "
1.)	48°	" 11' 00"	" " " "
	39°	"	" " " "
2.)	35°	" 30"	" " " "
	32°	" 12' 00"	" " " "
		30	
3.)	29°	" 13' 00"	" " "
4.)	26°	" 14 00"	

Gas given off at carbon.

at 10h 22' —
as a preliminary gives 19° defl. left, no extra resistance in circuit.
Charge from battery to give 80° defl. right with 21 ohms resist in circuit.
at 11h 57' extra resist = 13 ohms
" " " disconnect and discharged

	90°	— at 10h 57' 10"	no extra resist.
	82	30"	
1)	60	- - - - 58 00"	
	47	- - - - 30.	"
2)	36	- - - 59 00'	"
	32	- - - - 30	
3.)	29	- - 11h 00' 00"	" "
	27	- - - - 30"	
4.)	25	- - - - 01 00	
	33	- - - 30	
5)	22	- - - 02 00	" "

Gas given off.

 3rd charge.

5° left primary — 0 ohms extra resist.

Charge

80° right 3h 32' 00" 25 ohms extra resist

80° " 4h 07' 00" 13 " " "

Discharge

50	0h 07' 00"	0 ohms extra resist.
42	— — — 10"	"
34	— — — 20"	" "
32	— — — 30"	
30	— — — 40"	
27	1h - 08' - 00"	" " "
25	— — 30"	
23	2h - - 09' 00"	
21	— 30"	" " "
19	3h - 10' - 00"	
17	4h - 11' - 00"	
15	5h - 12' - 00"	
13	6h - - [illegible]' 00"	" " "
11	7h - [illegible] 00"	

Cell composed very small amounts of zinc & copper sulphates in porous pots with zinc & carbon electrodes in respective pots.

4° defl. 3 minutes after setting up.

5° " 10 " " " "

6° " 15 " " " "

6° " 20 " " " "

6° " 25 " " " "

6° is probably near the highest value.

Short circuited at 5h 30 P.M.

Wednesday, 14th June

All short-circuited last night gives no deflection at 9:10 a.m.
Current from battery sent through in opposite direction. No cell bright

20 min right 9h 10' 00" 16 ohms extra resist.
" " " 40' 00" ... 13 " " "

Discharge

5 left	9h 40' 10"	no extra resistance
5	20"	" "
6	41' 00"	
6	42' 00"	
5	43' 00"	
5	50' 00"	" "
5	10h 00' 00"	" "
5	10' 00"	" "
4	20' 00"	
4	30' 00"	"
4	40' 00"	
4	50' 00"	
4	11h 00' 00"	" "

Continuation of similar electrodes tests

#28- Pyrogallic acid

Cell	Time	Defl.	Remarks
nothing	11h: 52' 00"	-- 08 charge	Four cells in series no extra resist.
	12h: 02' 00"	-- 05 ...	
	02' 7"	-- 1 disch	Gas lightly
	10	-- 1 "	Positive pl. black
	20	-- 0	

#29- Tannic acid

Cell	Time	Defl.	Remarks
nothing	12h 17' 00"	-- 18 charge	Faint cloudy precip.
	27' 00"	-- 16	
	27 - 3	-- 1 disch	
	10	-- 0	
	20	-- 0	

#30- Tannic acid + Pb. Ac.

Cell	Time	Defl.	Remarks
nothing	2h 01' 00"	-- 60 charge	Gas lightly from negative!
	11' 00"	-- "	
	11 -- 3	9 disch	
	10	-- 7	
	20	-- 6 "	
	30	-- 6	
	40	-- 6	
	50	-- 5	
	12' 00	-- 5	

Brass & Bean

#31 – Glycerin & Sodium chloride

nothing	2h 16'00" – 30 charge 26'00" – 28 26' – 4.3 disch 10 – 3 20 – 1	Gas slightly

#32 – Glycerin & Sulph. ac.

nothing	2h 32'00" – 60 charge 42'00" – 60 42' – 4.14 disch 10 – 12 20 – 12 30 – 12 40 – 11 50 – 11 43' – 00 – 11 15 – 11 30 – 10 45 – 10 44' – 00 – 10 15 – 9 30 – 9 45 – 9 45' – 00 – 8 15 – 8 30 – 7 46' – 00 – 7 15 – 6	Gas freely. Gray coating on positive

Brass & Bean

#33 – Glycerin & Ph. ac.

nothing	2h 51'00" – 60 charge 53'00" – 60 3h 01'00" – 42 01 – 2.11 disch 10 – 4 20 – 2 30 – 1	Gas given freely. Faint cream precip

#34 – Oxalic acid

nothing	3h 03'00" – 60 charge 06'00" – 60 13'00" – 75 13' – – disch 10 – 0 20 – 0	Positive pl blackened Neg. pl. gives gas

#35 – Oxalic & Phosph. ac. 5.6

nothing	3h 25'00" – 60 charge 28'00" – 60 28' – 4.9 disch 10 – 8 20 – 8 30 – 8 40 – 7 50 – 7 29' – 00 – 7 15 – 6 30 – 6 33' – 00 – 5	Gas freely

 #36 - Iotrice acid   Burr & Burr

Nothing --- 3h 34' 00" - 60 ch   Gas lightly
40 00 - 60 "
44 00 - 30 "
44' - 5 36 disch
10 - 32
20 - 27   Plates black-
30 - 24   -ened
40 - 23 "
50 - 22
45' - 00 - 22
15 - 21 "
30 - 19
46 - 00 - 16
30 - 14 "
47 - 00 - 12
30 - 10
48 - 00 - 7
30 - 4

#37' - Iotric ac. & Ph ac. sl   Burr & Burr

Nothing 4h 00' 00" - 60 charge   Gas lightly
14' 00" - 60 "
14 - - 2 14 disch   Plates blacken-
10 - 13   -ed
20 - 12
30 - 10 "
40 - 8
50 - 7
15' - 00 - 6
15 - 6 "
30 - 5
- 00 - 5

#38 - Alum

Nothing 4h 23' 00" - 60 charge   Gas lightly
33' 00" - 60 "
33 - 5 - 15 disch
10 - 14
20 - 13
30 - 10
40 - 8
50 - 6
34 - 00 - 5 "
15 - 4

Beers & Beers

#39 - alum & Pt. Ac.

Nothing	4h 41' 00"	60 charg	Faint white ppt.
	51' 00"	60 "	
	51' - 5	14 Leak	
	10	13	
	20	12	
	30	12	
	40	11	
	50	11	
	52' - 00	10	
	15	10	
	30	9	
	53' - 00	8	
	30	6	
	54' - 00	5	

#40 - alum & Mangan Sulph

Nothing	4h 55' 00"	60 ch	Plates discoloured
	5h 05' 00"	60 "	
	05'	15 Leak	
	10	14	
	20	13	
	30	12	
	40	12	
	50	11	
	06' - 00	10	
	15	8	
	30	6	
	07' 00	5	

Beers & Beers

#43 Arsenite of Mangan & Zinc Sulph

	5h 10' 00"	60 charg	Dark deposit on both plates
	20' 00"	60 "	
	20' 00	15 Leak	
	10	14	
	20	13	
	30	13	
	40	13	
	50	12	
	21' - 00	12	
	15	12	
	30	11	
	22' - 00	10	
	30	10	
	23' - 00	10	
	30	10	
	24' - 00	9	
	30	9	
	25' - 00	8	

#44 - Barium Chloride

	5h 28' 00"	60 charge	
	38' 00"	60 "	
	38' 00	0 Leak	
	10	0	
	20	0	
	30	0	

Thursday, 10th June 50

#41 Am. cit. of Iron & Zinc Sulph. [illegible]

nothing	9h 13' 00"	60 ch.	
	33' 00"	60	Gas very lightly
	23 – 4	150 disch	
	10	90	
	20	56	
	30	38	
	40	28	
	50	24	
	1.) 24' – 00	22	
	15	20	
	30	18	
	2.) 25' – 00	16	
	30	14	
	3.) 26' – 00	12	
	30	11	
	4.) 27 – 00	10	
	30	10	
	5.) 28' – 00	9	
	6.) 29' 00"	9	
	7.) 30 00"	9	
	8.) 31' 00"	9	
	9.) 32' 00"	8	
	10 33 00"	8	
	34 00"	8	

Brown & Bros

#45 – Barium & Magnesium chlorides

nothing	9h 40' 00"	60 charge	Plates blackened
	50' 00"	60 "	
	50 – 4	60 disch	
	10	25	
	20	11	
	30	6	
	40	4	

#46 – Sulphate of Iron

1° night	9h 56' 00"	60 ch	Very little gas.
	10h 06' 00"	–	
	06 – 5	90 disch	
	10	43	
	20	21	
	30	14	
	40	11	
	50	9	
	07' 00	8	
	15	7	
	30	6	

#50 – Carbonate of Potassium

nothing	10h 13' 00"	60 charge	Gas freely given off
	23 00"	60 "	
	23 – 3	15 disch	
	10	10	
	20	5	
	30	2	
	40	0	

 Buss & Bien

#51 - Bi carbonate of Potass

nothing	10h 25' 00" - 60 ch	Gas freely.
	35' 00" - 60 "	
	35 - 6.5 disch	
	10 - 3	
	20 - 2	

#52 - Sulphite of Potass.

nothing	10h 40' 00" - 60 ch	Gas freely.
	50' 00" - 60	given from
	50' [illegible] 22 disch	neg. pl.
	10 - 14	
	20 - 10	
	30 - 5	
	40 - 4	

#53 - Bi-sulphate of Potass.

nothing	10h 56' 00" - 60 ch	
	11h 06' 00" - 60 "	Gas lightly
	06 - 3 - 95 disch	
	10 - 62	
	20 - 46	
	30 - 38	
	40 - 35	
	50 - 30	
	1.) 07' - 00 - 27	
	15 - 23	
	30 - 21	
	2.) 08' - 00 - 18	
	3.) 09' - 00" - 11	
	10' - 00" - 4	

Buss & Bien

#54 - Bromide of Potassium

nothing	11h 13' 00" - 60 charge	Gas freely from
	23' 00" - "	neg. none from
	23 - 5 - 6 disch	positive plate
	10 - 3	
	20 - 2	

#55 - Permanganate of Potass.

nothing	11h 25' 00" - 60 charge	
	35' 00" - 60 "	
	35 - 5 - 2 disch	
	10 - 0	

#56 - Sulpho-cyanide of Potass

1° left	11h 37' 00" - 60 charge	Positive plate
	47' 00" - 60 "	immediately
	47 - 9 - 150	blackened
	10 - 140	neg. gives gas freely
	20 - 16	
	30 - 10	Brown precip.
	40 - 9	
	50 - 8	
	48' - 00 - 7	
	15 - 5	
	30 - 2	

 Brass x Brass

#57 - Ferro-cyanide of Potash

2° repit	11h 55' 00" ~ 60 clay		
	12h 05' 00" 60 "		
	05' ~ 3	11 desch	
	10 ~	3	
	20 ~	2	
	30 ~	0	

#58 - Hypo-sulphite of Potass.

nothing	12h 10' 00" ~ 60 ch		Light precip
	20' 00" ~ 60 "		
	20 ~ 3	12 desch	
	10 ~	5	
	20 ~	2	
	30 ~	0	

#59 - Arseniate of Potass.

	12h 22' 00" ~ 60 ch		
	32 00" ~ 60 "		
	32 ~ 3	10 desch	
	10 ~	13	
	20 ~	7	
	30 ~	5	
	40 ~	4	
	50 ~	4	

Brass x Brass

#60 - Arseniate of Potass & Ph. Ac. Sl

nothing	12' 00" ~ 60 ch		Gas very freely.
	22' 00"	"	
	22 ~ 4	9 desch	
	10 ~	5	
	20 ~	3	
	30 ~	2	
	40 ~	2	

Friday 19th June. am
antimony & antimony.

#1 - Sodium Tungstate

nothing	9h	45' 00" - 60 charge	Gas freely from
		48 00" - 60 "	from neg. plate
		55' 00" - 18 "	
		55 - - 28 disch	
		10 - 2	
		20 - 1	

#2 - Red Fluid ($H_2SO_4 + K_2O\,2CrO_3 + H_2O$)

nothing	10h	06' 00" - 60 charge	
		30 - 10 "	
		16' 00" - 01 "	
		16 - - 1 disch	
		10 0	

#3 - Hyposulphite of Soda

nothing	10h	25' 00" 60 ch	Brown cloudy
		35' 00" - 60 "	precip.
		35' - 4 30 disch	
		10 - 11	
		20 - 6	
		30 - 4	
		40 - 3	

#4 - Nitro prusside of Soda

nothing	10h	47' 00" 50 ch.	
		15 - 40 "	
		57 - - 04	
		57 - - 0 disch	
		10 0	

#5 - Nitro prusside & Ph ac [illegible]

1' left	11h	08' 00" 50 ch	
		10 - 10 "	
		18' 00" -	
		18 - 3 7	
		10 - 3	

#6 - Manganese sulphate

nothing	2h	28' 00" 50 ch.	Faint brown
		38' 00" - 72.	precip.
		38' - 9 47	
		10 - 46	
		20 - 24	
		30 - 14	
		40 - 9	
		50 - 7	
		39' - 00 - 5	
		15 - 4	
		30 - 3	

Antimony [illegible]

#7 – Manganese Chloride

Nothing	3h 43' on – 45 ch	
	53' on – 06 ch	
	53' – 5 30 disch	
	10 – 22	
	20 – 14	
	30 – 12	
	40 – 9	
	50 – 6	
	00 – 6	
	15 – 5	

#8 – Ph. ac.

Nothing	2h 56' on – 60 ch	
	3h 06' on – 60 ch	Goes freely
	06 – 3 20 disch	Plates blackened
	10 – 6	
	20 – 3	

#9 – Mangan + Zinc Sulphates

Nothing	3h 12' on – 60 ch	no go
	20' on	
	22' – 2 65	
	10 – 42	
	20 – 30	
	40 – 20	
	23' – 00 – 14	
	30 – 10	
	24' 00 – 8	
	25' 00 – 6	

Sb + Sb.

#10 – Sb. Phosph. ac.

1° night	4h 00' on – 60 ch	Plates blackened
	30 – 30	
	10 – 00 – 06	
	10 – 6	
	10 – 2	
	20 – 1	

#11 – Hypnos: Mangan + Ph. ac. – Sb.

1° night	4h 14' on – 60 ch	Plates blackened
	30 – 40	
	15 – 00 – 10	
	24 – 00 – 4	
	24 – 30 – 0 disch	
	10 – 0	
	20 – 0	

#14 – Ferric Cyanide

nothing	5h 00' on – 60 ch	Goes freely gives off
	10' on – 60	
	10' – 5 50 disch	
	10 – 40	
	20 – 23	
	30 – 16	
	40 – 11	
	11' – 00 – 7	
	30 – 4	

 #15 – Boracic acid

Sb + St

nothing	5h 15' 00" – 40 ch		Gas very lightly. Plates blackened.
	30 – 25		
	25' 00" – 9		
	25 – – 0 disch		
	10 – 0		

#16 – Tungsten Chl. & Ch. ac. Sl.

nothing	5h 28' 00" – 20 ch	
	30 – 10	
	38' 00 – 6	
	38 – 7 20 disch	
	10 – 11	
	20 – 3	
	30 – 1	

Saturday, 20th June

Sb + St.

#18 – Phosphate of Soda

nothing	9h 15' 00" – 60 charge	Gas freely
	do 00" – 60	
	30 – 20	
	25' 00" – 12	
	25 – – 2.2 disch.	
	10 – 1	
	20 – 1	

#19 – acetate of Soda

nothing	9h 37' 00" – 60 charge	Gas lightly
	30 – 35	
	47' 00" – 16	
	47 – 3 – 6 disch	
	10 – 5	
	20 – 4	
	30 – 3	

#20 – acetic acid

9h 52' 00" – 60 ch	
10h 30" – 50 "	
02 00" – 7	
02 – – 1 disch	
10 – 0	

 #61 - Acetic ac & Ph. ac. Sl Sl x Sl.

Nothing	10h 17' 00" - 60 ch	Gas lightly
	30 - 30 "	
	27 00 - 6 "	
	27 - -787 disch	
	10 - 26	
	20 - 15	
	30 - 13	
	40 - 11	
	50 - 9	
	28 - 00 - 8	
	15 - 7 "	
	30 - 6	

#23 - Arsenious acid

nothing	10h 32' 00" - 60 ch	Gas [illegible]
	- 30" - 40 "	
	42' 00" - 10	
	42 - 3-2 disch	
	10 - 1	
	20 - 1	

#26 Zinc & [illegible] sulphate

Nothing	11h 11' 00" - 60 ch	Plates blacken
	21' 00" - 60 "	
	21 - 190.	
	10 63	
	30 - 24	
	22 - 00 - 20	
	30 - 17	
	23, 00 - 16	
	24 00" - 9	
	25 00" - 5	

#25 - Citric acid. Thursday 22nd Jan

Antimony & Antimony

1° left	9h 33' 00" - 60 ch.	Gas given off freely.
	33' 00" - 60 "	
	33' - - 217 disch	
	10 14	
	20 - 12 "	
	30 - 10	
	40 - 9	
	34 - 00 - 7	
	30 - 5 "	
	35' 00 - 3	

Sulphate of ammon & Zinc

nothing	9h 40 00" - 60 ch	Gas lightly
	50 00" - 60 "	
	50 - 130 disch	Plates blackened
	10 - 90	
	20 - 57	
	30 26	
	40 - 25	
	50 - 23	
	51' - 00 - 22	
	30 - 20	
	52' 00 - 20	
	53' 30 - 19	
	00 - 17	
	30 - 14	
	54 00 - 12	
	30 - 10	
	55 00 - 6	
	20' - 0	

 #Glycerin of am. + Ph. ae. Sl. Sb & St

nothing 10h 10' 00" - 60 ch. Goo freely
20' 00" 60 "
20 - 2 40 disch
10 - 11
20 - 2
30 - 1

#28 - Pyrogallic acid
nothing 10h 25' 00" - 10 ch.
35' 00" - 8 "
35' - 2 disch
10 - 1

#29 - Tannic acid
nothing 10h 39' 00" - 20 ch
49' 00" - 5 "
49 - 3 - 2 disch
10 - 1

#30 - Tannic ac. & Ph. ae. Sl.
nothing 10h 51' 00" - 60 ch Goo freely
11h 01' 00" - 60 " from both
01' - 7 32 disch plates,
10 - 30
20 - 23
30 - 12
40 - 8
50 - 7
60 - 6

#31 - Glycerin & Sodium chloride Sb & St
nothing 11h 05' 00" - 30 chg. Goo freely
15' 00" 10 "
15' - 6 disch
10 - 5
20 - 4
30 - 4
40 - 3

#32 - Glycerin & sulphuric acid
nothing 11h 17' 00" - 60 chg. Goo freely
27' 00" - 20 "
37 - 5/10 disch
10 - 28
20 - 9
30 - 5
40 - 3

#33 - Glycerin & Ph. ae. Sl.
nothing 11h 39' 00" 50
49' "
49 - 7 - 2 disch
10 - 2
20 - 2
30 - 1

 #34 – Oxalic acid Sb & Sb

nothing.	11h	45' 00" – 60 ch	Gas very rapidly from neg. plate.
		55 00" – 60 "	
		55 – 2 23 disch	
		10 – 6	
		20 – 2 "	
		30 – 1	

#35 – Oxalic acid & Ph. Ac. Sl.

nothing	11h	59' 00" – 60 ch	Gas slightly
	12h	09' 00" – 32 "	
		09 – 4 58 disch	
		10 – 56	
		20 – 37	
		30 – 17	
		40 – 8	
		50 – 6	
		60 – 5	

#36 – Tartaric acid

nothing	12h	13' 00" – 60 ch	Gas freely from neg plate.
		23' 00" – 60 "	
		23 – 6 28 disch	
		10 – 23	
		20 – 20	
		30 – 15	
		24 – 00 – 13	
		30 – 9	
		25 – 00 – 7	
		26 – 30 – 6	
		00 – 5	

Sb & Sb

#37 – Tartaric acid & Ph. Ac. Sl.

1° nipple	12h	58' 00" – 60 charge	Gas freely from neg. plate
		38 00" – 60 "	
		38 – 15 – 72 disch	
		10 – 47	
		20 – 26	
		30 – 19	
		40 – 16	
		50 – 13	
		39 – 00 – 10	
		15 – 7	

#38 – Alum.

nothing	2h	01' 00" – 60 charge	White precip.
		11' 00" – 10 "	
		11 – – 1 disch	
		10 – 0	
		20 – 0	

#39 – Alum & Ph. Ac. Sl.

nothing	2h	18' 00" – 60 ch	White prec.
		28' 00" – 65 "	
		28' – 10 40 disch	
		20 – 35	
		30 – 21	
		40 – 10	
		50 – 7	
		29 – 00 – 5	
		15 – 3	

Sh & St

#40 = Alum & Uranyl Sulphate

Nothing	2h 37' 00" – 60 ch	
	47 00 – 7 "	Gas lightly
	47 – 6.65	fried off
	10 – 58	
	20 – 45	
	30 – 30	
	40 – 24	
	50 – 19	
1.)	48 – 00 – 18	
	15 – 16	
	30 – 13	
	45 – 11	Black
2.)	49 – 00 – 9	deposit.
	30 – 9	
3.)	50' 00 – 8	
4.)	51' 00 – 7	
5.)	52' 00 – 6	
6.)	53 – 00 – 5	

St & St

#43 – Arsenide of Uranyl & Zinc Sulph.

1° reject	2h 55' 00" – 60 ch	Gas very rapidly
	3h 05' 00" – 60 "	
	05 – 95 with	Black – is poss.
	10 – 62	
	20 – 34	
	30 – 30	
	40 – 27	
1.)	06' – 00 – 22	
	30 – 18	
2.)	07' 00 – 14	
	30 – 11	
3.)	08' 00 – 9	
	30 – 8	
4.)	09' 00 – 7	
5.)	10' – 00 – 5	

#44 – Barium chloride

Nothing	3h 16' 00" – 60 ch	
	26' 00" – 0 –	
	26 – 4 00 discharge	
	10 – 8	
	20 – 4 "	
	30 – 3	
	40 – 2	
	50 – 1	

#45 - Barium & [illegible] Chloride 5b x 5b

1° left

3h 31' 00" - 60 ch
41' 00" - 8 "
41 - 4 - 65 disch
10 - 27
20 - 18
30 - 14 "
40 - 10
50 - 7
42' - 00 - 6
15 - 5 "

#46 - Sulphate of Iron

nothing

3h 47' 00" - 60 ch
57' 00" 60 "
57 - 8 27 disch
10 - 41
20 - 38
30 - 34 "
40 - 27
50 - 23
58' - 00 - 20
15 - 18 "
30 - 15
4h 59 - 00 - 13
00' - 00 - 10
01' - 00 - 8
02 - 00 - 7
03 - 00

Gray coating on plates.

#50 - Carbonate of Potass. 5b x 5b

nothing

4h 29' 00" - 60 ch
39 00 - 60 "
39 - 3 - 7 disch
10 - 2
20 - 1

Gas freely from both plates

#51 - Bi-carbonate of Potass

nothing

4h 41' 00 - 60 ch
41 30 - 60 "
51 - 00 - 12
51 - 4 - 6
10 - 3
20 - 2

#52 - Sulphate of Potass.

nothing

4h 56' 00" - 60 ch
5h 06' 00" - 35 "
06' - 05 - 32 disch
10 - 27
20 - 17
30 - 13
40 - 11
50 - 9
07' - 00 - 7
15 - 5

Gas very freely from off.

Brown color to solution.

Sb & Sh

#53 – Bi-sulphate of Potass.

Nothing	5h	09' 00" – 60 ch	Gas lightly
		19' 00" – 60 "	
		19' – – – disch.	
		10 – 150	
		20 – 95 "	
		30 – 55	
		40 – 32	
		50 – 18	
		20' – 00 – 8	
		15 – 5	
		30 – 3	

#54 – Bromide of Potass.

	5h	24' 00" – 60 ch	Gas from neg. pl.
		34' 00" – 60 "	
		34 – – 3 – 20 disch	
		10 – 12	
		20 – 9	
		30 – 6	
		40 – 4	

#55 – Permanganate of Potass. Sb & Sb

Nothing	9h	18' 00" – 60 charge	
		28 00" – 18 "	
		28 – – 6 – disch	
		10 – 3	
		20 – 1 "	

#56 – Sulpho-cyanide of K

Bright	9h	33' 00" – 60 ch.	Gas readily from neg. pl.
		43 00" – 60 "	
		43 – 3 – 36 disch.	
		10 – 12	
		20 – 8 "	
		30 – 6	
		40 – 5 "	
		50 – 4	

#57 – Ferrocyanide of Potass.

Nothing	9h	51' 00" – 60 ch.	Gas from neg. plate.
	10h	01 00" – 8 "	
		01 – 4 – 4 disch	
		10 – 4	
		20 – 4	
		30 – 3	

 #58 - Hypophosphite of Potass

Sb 45L

nothing	10h 03' ao" - 60 ch	No gas from
	13 ao" - 60 "	"
	13' - 5 - 40 disch	"
	10 - 34	heavy brown
	20 - 21	precipitate.
	30 - 12	
	40 - 9	
	50 - 8	
	14' - 00 - 7	
	15 - 5	

#59 - Arseniate of Potass.

nothing	10h 32' ao" - 60 ch.	Brown precip.
	32 ao" - 60 "	Gas freely from
	32' - 3 - 40 disch	neg. plate
	10 - 13	
	20 - 5	
	30 - 3	

#60 - arseniate of Potass & Phosph. of Potass

nothing	10h 36' ao" - 60 disch	Black precip.
	4' ao - 60	
	6 - 20	
	10 - 14	
	20 - 5	
	30 - 2	

New Solutions

#61 Bromic Acid & aq - 1:4
#62 Terchloride of antimony (conc. [illegible])
#63 " " " & Chloride of Zinc
#64 " " " & " " Tin
#65 " " " citr. of (Fe & Am) & Zn SO4
#66 " " " " " " + aq 1:1
#67 " " " + chloride of Mag (hydr acid)
#68 " " " + " " Mag

7) Copper & Copper

#61 - Benzoic acid

2° left	3h 49' 00" - 60 ch	Extra Resist 50 ohms	Yellowish color
	59' 00" - 60 "	45 "	given to solution
	59' - 10 - 2 disch.	0 "	
	30 - 1		

8) Silver & Silver

#61 - 1° right	4h 04' 00" - 60 ch	49 ohms	neg. pl. darkened
	14' 00" - 60 "	40	Heavy white cloudy
	14' - 6 24 disch.	0 ohms	precip. from
	10 - 22		positive
	20 - 14 "		
	30 - 10		
	40 - 8		
	50 - 6		
	60 - 5		
	75 - 4		

6) Lead & Lead

#61 - nothing	4h 20' 00" - 60 ch	50 ohms	Plates stained
	30' 00" "	40 "	
	30 - 0 disch.		
	10 - 0		
	20 - 0		

7) Nickel & Nickel

#61 - nothing	4h 37' 00" - 60 ch.	45 ohms	neg. pl.
	47 00 - 60	30 "	blackened
	47 - 5 1/2 disch.	0 "	
	10 - 10		
	20 - 7		
	30 - 5		
	40 - 4		

24th June, 1885

#61 - Bromic acid. (1) Zinc & Zinc

Cell	Time	Deflection	Extra Resistance	Remarks
1° left	9h 18' 00" - 60 ch		40 ohms	Gas slightly from neg. pl.
	28' 00" - 60	"	34 "	
	28 - 2.7	disch.	0 "	
	10 - 5			
	20 - 4	"		
	30 - 3			

#61 - (2) Zinc & Zinc

nothing	9h 33' 00" - 60 ch		31 ohms	Gas freely from neg. plate.
	43' 00" - 60	"	31 "	
	43 - 4.14	disch.	0 "	
	10 - 8			
	20 - 4			
	30 - 2			

#61 - (3) Antimony & antimony

nothing	9h 49' 00" - 60 ch		4 ohms	Gas from both plates
	59' 00" - 36	"	0 "	
	59 - 5.8	disch.	0 "	
	10 - 7			
	20 - 5			
	30 - 3			

#61 - (5) Iron & Iron

nothing	10h 01' 00" - 60 ch		39 ohms	Gas freely from neg. pl. Positive plate red coloration
	11' 00" - 60	"	43 "	
	11 - 5.23	disch.	0 "	
	10 - 19			
	20 - 16	"		
	30 - 11			
	40 - 7			
	50 - 5			
	12' - 00 - 3.			

#61 - (6) Carbon & Carbon

	10h 14' 00" - 60 ch		26 ohms	Gas slightly from neg. pl.
	24' 00" - 60	"	30 "	
	24 - 5.68	disch.	"	
	10 - 27			
	20 - 15			
	30 - 11			
	40 - 9			
	50 - 7			
	- 00 - 6			
	15 - 5			

#61 — y Calcium & Calcium

nothing	10h	37' 00" 60 ch	39 ohms	Gas freely
		47' 00" 60 "	30 "	from neg.
		47 - 3 - 4 disch 0 "		
		10 - 2		
		20 - 1	"	
		30 - 1	"	

#61 — Brass & Brass

nothing	10h	54' 00" 60 ch	30 ohms	
	11h	44 00" 60	" 12 "	Gas freely
		44 - 3.8	disch 0 "	from neg
		10 - 7		plate.
		20 - 4		
		30 - 2		

y Antimony & Antimony

#62 — Terchloride of Antimony

nothing	11h 31' 00" 60 ch		54 ohms	no gas —
	41 00" 60 "		54 "	dark color
	41 - 5 4 disch 0			to neg.
	10 - 2			plate
	20 - 1			

#62 — y Calcium & Ca

1° left	11h 44' 00" 60 ch		5 ohms	Both plates
	54' 00" 60	"	5 0 "	immediately
	54 —	disch 0	"	blackened.
	10			Gas freely before
	20			breaking. black
	30	15 0		deposit & precip.
	40	13 5		
	50	12 0		
	55 00	6 0		Heavy
	15	— 6 0		black
	30	— 5		precip.
	45	+ 2		
	56' 00	+ 4		
	30	+ 12		

 #62.

3) Carbon & C

1° left	h	34' 00" – 60 ch	57 ohms	very little
		44' 00" – 60 "	44 "	[illegible]
		46 — desch	0 "	[illegible]
		17 – 150		
		20 – 135		
		30 – 72		
		40 – 39		
		50 – 31		
		45' – 00 – 24		
		15 – 19		
		30 – 15		
		45 – 12		
		46 – 00 – 10		
		15 – 8		
		30 – 7		
		47' 00 – 6		

#62.

4) Copper & Cu

nothing	2h 3h	51' 00" – 60 ch	54 ohms	Plates stained
		01 00" – 60 "	52 "	slightly a
		01 – 3 – 4 desch	0	silvery color
		10 – 3		
		20 – 2		
		30 – 1		

5) Iron & Fe

#62.

nothing	3h	18' 00" – 60 ch	55 ohms	no action
		23 00" – 60 "	53 "	
		23 – 49 desch	0 "	
		10 – 4		
		20 – 2		
		30 – 1		

#62.

6 Lead & Pb

nothing	3h	34' 00" – 60 ch	54 ohms	Varnish col.
		44' 00" – "	0 "	action
		44 – 54 desch		
		10 – 0		
		20		

#62 —

7) Nickel & Ni

nothing	3h	47' 00" – 60 ch	54 ohms
		57' 00" – "	52 "
		57 – 52 desch	0 "
		10 – 2	
		20 – 1	
		30 – 1	

#62. 9) Sn + Sn

3° left 4h 02' av"—60 ch 55 shw. Gas freely from both.
12' av" — " 53 "
12' — 5-8 disch. 0 " Heavy black flaky deposit on forceps.
10—6
20—4 "
30—3 "

#62 — 8) Silver + Ag

1° right 4h 14' av"—60 ch 52 shw.
24' av" — " 34 "
24' — 3-2 (disch)
10—14 "
20—11
30—10
40—8
50—7
25' — 00—6
30—5

#62 — 10) Sn + Sn

Gas given off too rapidly to make observation. Great heat evolved.

1) Antimony + Sb

#63 — Tendencies of Sb + Alloying of Sn

1° right 4h 58' av' 60 ch 61 shw
5h 08' — 60 2 " 58 "
10 1

#63 — 4) Cu + Cu

5h 22' av" 60 ch 50 sh. silvery deposit.
32' av"—32 " 0
32 — 5-1 disch 0
10—0
20—0
30—0

Thursday 25th June

#63 — 3) Carbon & Carbon

1½ inch 9h 33'30" ev ch 49 ohms very little
42' ao—eo " 42 " on two [illegible]
42' ... disch 0 " [illegible]
10 - 150
20 - 105 "
30 - 84
40 - 56
50 - 46
1) 43' - 00 - 40
15 37
30 32
45 27
2) 44 - 00 - 23
30 - [illegible]
3) 45 - 00 - 14
30 - 12
4) 46 00 - 10
30 - 9
5.) 47 - 00 - 8
6.) 48 - 00 - 7
7.) 49 - 00 -
8.) 50 - 00 - 5
9.) 51 - 00 - 5

2) Cd & Cd

#63 —

nothing 10h 00' 00" - ev ch 57 ohms Positive [illegible]
10' 00" - [illegible] " 0 " [illegible]
10 - 7 - 30 disch 0 "
10 - 26
20 - 14 "
30 - 11
40 - 10
50 - 9
11 00" - 8

#63 — 3) Fe & Fe

nothing 10 17' 00" - eo ch 55 ohms
24' 00" - eo " 51 "
27 - 3 - 6 disch
10 - 4
20 - 3

#63 — 4) Pb & Pb

nothing 10h 31' 00" - eo charge 50 ohms
41 00" - eo " 21
41 - 3 - 2
10 - 1
20 -

#63 — 7) Mis & W

nothing	10^h 51' 00" — 60 ch	54 ohm	
	11^h 01' 00" — 60 "	48 "	
	01 — 3.2 decl.		
	10 — 1		
	20 — 1		
	30 — 0		

#63 — 7) Dilan & aj.

nothing	11^h 14' 00" 60 ch	51 ohm	Too lightly frozen, positively, region of black kernels
	24' 00" — 26 "	0 "	
	24 — 3.5 decl.	0	
	10 — 5		
	20 — 4		
	30 — 3		

#63 — 9) C & Sn

nothing	11^h 26' 00" — 60 ch	56 ohm	Too lightly deformed (frozen)
	36' 00" — 60 "	50 "	
	36 — 2.6 decl.	0 "	
	10 — 22		
	20 — 17		
	30 — 15		
	40 — 14		
	37' — 00 — 13		
	30 — 12		
	38' — 00 — 11		
	39 — 00" — 14		
	40 — 00" — 15		
	3) 42 — 00 — 16 freezing		

Time acted on too rapidly.

9) Sh & Ch

#64 — Irradiation of ant. & chlorine of Sn

nothing	2^h 19' 00" — 60 ch	56 ohm	Faint discoloration
	29' 00" — 60 "	49	
	29 — 5 — 1	0 "	
	10 — 1		
	20 — 0		

#64 — 3) ed & Cu

20° left	2^h 41' 00" 60 ch	58 ohm	Plates instantly black kernels
	51' 00" — 60 "	51 "	
	51 — 2.6 decl.	0 "	
	10 — 4		
	20 — 2		
	30 — 5		
	40 — 8		
	52' 00 — 9		
	30 — 6		

#64 — 3) C & C

1° right	3^h 55' 00" — 60 ch	50 ohm	
	3^h 05' 00" — 60 "	45 "	
	05' — 3.6 decl.	0 "	
	10 — 3		
	20 — 3		
	30 — 2		
	40 — 2		

#64— 4) Cu & Cu

nothing 3h 08' 00" – 60 ch – 50 ohms Greenish colour to plates
15' 00" – 60 " 47 "
15 – 3.5 disch 0 "
10 – 4
20 – 3

#64— 5) Fe & Fe

1° left 3h 23' 00" – 60 ch. 52 ohms
33 00" – 60 " 48 "
33 – 5.4 disch 0 "
10 – 4
20 – 3 "
30 – 3

#64— 6) Pb & Pb

nothing 3h 37' 00" – 60 ch – 50 ohms Faint precipitate
47 00" – 60 " – 30 "
47 – 2.4 disch 0 "
10 – 4
20 – 5
30 – 5
40 – 6

#64— 7) Ni & Ni

nothing 3h 49' 00" – 60 ch – 49 ohms Plates stained faintly.
59 00" – 60 " 48 "
59 – 1.5 disch 0 "
10 – 3
20 – 2
30 – [illegible]

#64— Ag & Ag

1° right 4h 02' 00" – 60 ch 50 ohms Faint heavy precip. Lead coloured deposit on Ag. pl.
12' 00" – 60 " 21 "
12 – 1.32 disch 0 "
10 – 23
20 – 14 "
30 – 10
40 – 9
13' – 50 – 7
30 – 5
14' 00 – 4

#64— Sn & Sn

1° right 4h 20' 00" – 60 ch. 57 ohms Black stain immediately
30' 00" – 60 " – 50 "
30 – 3.21 disch 0 "
10 – 20
20 – 18
30 – 17
40 – 17
1) 31' – 00 – 17
30 – 16
5) 32' – 00 – 16
30 – 15
2) 33' – 00 – 20
4) 34 – 00 – 15
3) 34 – 00 – 8
Heavy precip.

#65 – { Citrate of Iron & Ammon. / Zinc Sulphate / Terchloride of Antimony }

1) Sb & Sb

Cell	Time	Defl.	Int. Resist.	Remarks
7° right	5h 07' 00"	60 ch.	540 ohms	
	17' 00"	60 "	51 "	
	17' 00.5	36 disch.	0 "	Reddish
	10	35 "		deposits
	20	34 "	" "	on plates
	30	34 "		
	40	33 "		[illegible]
	1) 15' 00	32 "		
	15	29 "		
	30	26 "		
	45	24 "		
	2) 19' 00	22 "		
	30	16		
	3) 20' 00	9		
	30	7		

#65 – 2) Cd & Cd

Cell	Time	Defl.	Int. Resist.	Remarks
5-6° left	5h 23' 00"	60 ch.	540 ohms	Black
	33' 00"	60 "	54 "	many deposits [illegible]
	33 – 3	110 disch.	0 "	
	10	110 "		
	20	105		
	30	105		
	1) 34' 00	95		
	30	86		
	2) 35' 00	68		[illegible]
	30	60		
	3) 36' 00	56		
	4) 37' 00	51		
	5) 38' 00	44		

Friday, 26th June

#65 – (new)

3) Carbon & C

1° right	9h 39' 00"	60 ch.	55 ohms	
	49' 00"	60 "	44 "	no
	49	disch.	0 "	[illegible]
	15	150		
	20	105		
	30	58		
	40	39		
	50	29		
	1) 5' 00	23		
	15	15		
	30	14		
	2) 51' 00	9		
	30	6		

#65 – 4) Cu & Cu

nothing	9h 54' 00"	60 ch.	57 ohms
	10h 04' 00"	60 "	54 "
	04	13 disch.	
	10	11	
	20	11	
	30	12	
	40	12	

 4/65 — 5) Dean & Fe...

6° right	10h 09' 00"	60 ch	56 ohms	very little deposit on plates
	19' 00"	60 "	54 "	
	19' 5	23 disch	0	
	10	22	" "	
	20	22	"	
	30	21	"	
	40	21		
	20' 00	20		
	30	17		
	21 00	16		
	22 00	15		
	23 00	14		

4/65 — 6) Po & Pt

nothing	10h 35' 00"	60 ch	52 ohms
	45' 00"	35 "	0 "
	45	4+6 disch	0
	10	+1	
	30	0	

4/65 — 7) Ni & Ni

1° right	10h 51' 00"	60 ch	56 ohms
	11h 01 00"	60 "	51 "
	01	+2+1 disch	0
	10	2	
	20	4	
	30	5	

4/65 — 8) Ag & Ag

6° right	11h 09' 00"	60 ch	41 ohms	Plates blackened
	19' 00"	60 "	12 "	
	19	+2 9 disch	0	
	10	6		
	20	4		
	30	3		

4/65 — 9) Sn & Sn

1° left	11h 25' 00"	60 ch	55 ohms	P black stain immediately
	35' 00"	60 "	52 "	
	35'	+22 disch	0	
	10	23		
	20	22		
	30	22		
	40	22		Plates considerably corroded
1)	36 00	22		
	30	21		
2)	37 00	22		
	30	23		
3)	38 00	23		
4)	39 00	21		
5)	40 00	20		
6)	41 00	16		
7)	42 00	8		
	15	0		
9)	44	−8		

Sn & Zn

#66 - Previous solution to which is added an equal volume of water - much thick mess

2° left	1h 42' 00"	60 ch	56 ohms	Black lump
	52' 00"	60 "	52	
	52	break	0 "	
	10	9 "		
	20	5		
	30	5		

#66 — Sb & Sn

10° left	2h 17' 00"	60 ch	54 ohms
	27' 00"	60 "	50 "
	27	1 break	0 "
	10	2	
	20	4	

#66 — C & C

1° left	2h 32' 00"	60 ch	53 ohms
	42 00"	60 "	49 "
	42	5 60 break	0
	10	32	
	20	15	
	30	8	
	40	6	
	50	4	
	60	3	

C & C

#67 - Mangan & Zinc Chlorides in Verchlorid of antimony

Nothing	2h 59' 00"	30 ch	45 ohms	Gas forms
	49 00"	60 "	40 "	piled off
	09			
	16 15	0 break	0 "	
	20	140		Carbon cut round
	30	125		$= 3/4 \times 3/4 \times 1/4$
	40	100		
	50	86		
1)	10 00	74		
	15	65		
	30	53		
	45	46		
2)	11 00	35		
	15	33		
	30	32		
3)	12 00	26		
	30	22		
4)	13 00	15		
	30	15		
5)	14 00	12		
	30	10		
6)	15 00	9		
7)	16 00	8		
8)	17 00	7		
9)	18 00	6 "		
10)	19 00	5 "		
13)	20 00	4 "		

2nd Charging of premium plates C.K.L

40° inj. at	3h 26' 00"	60 ch	45 ch
	36' 00"	50 ..	40 ..
	36' - - -		disk 0
		20 150	
		30 135	
		40 110	
		50 90	
1)	37' - - 00 73		
		15 - 68	
		30 .. 57	
		45 - 49	
2)	38 - 00 - 43		
		15 - 37	
		30 - 33	
3)	39' - 00 - 27		
		30 - 22	
4)	40' - 00 - 19		
		30 - 16	
5)	41 - 00 - 14		
		30 - 12	
6)	42' - 00 - 11		
		30 - 10	
7)	43 - 00 - 9		
		30 - 8	
8)	44 - 00 - 7		
9)	45' 00 - 6		
11)	47 - 00 - 4		
13)	49' - 00" - 3		

3rd charge. C.F.C

2° inj. at	4h 11' 00"	60 ch	46 ch	
	11 00	60 ..	47 ..	
	11 - - -		disk 0 ..	The pressure of the piece is probably
		20 ..		
		1.150		
		30 135		
		40 125		
		50 115		
1)	12' - 00 - 100			
		15 - - 87		
		30 - - 65		
		45 - 54		
2)	13' 00 - - 47			
		15 - 42		
		30 - 37		
3)	14' - 00 - 29			
		30 - 25		
4)	15' - 00 - 22			
		30 20		
5)	16' - 00 - 18			
		30 - 15		
6)	17 - 00 - 13			
		30 - 12		
7)	18' - 00 - 11			
8)	19 - 00 - 9			
9)	20 00 - 8			
10)	21 - 00 - 7			
11)	22 00 - 6			
12)	23 00 - 5			
13)	24 00 - 4			

4th charge | 5th charge | C4 C

4h 33' 00"	60 ch	45 ch
43' 00"	60 "	39 "
43' - - -	tried	0 "
10	"	0 "
23	150	
30	138	
40	125	
50	110	
1) 44 -- 00	100	
15	82	
30	71	
45	57	
2) 45 -- 00	50	
15	44	
30	39	
3) 46 -- 00	32	
30	27	
4) 47 -- 00	23	
30	21	
5) 48 -- 00	18	
30	16	
6) 49 -- 00	14	
30	13	
7) 50 -- 00	12	
30	11	
8) 51 -- 00	10	
9) 52 -- 00	8	
10) 53 -- 00	7	
11) 54 -- 00	6	

5h 03' 00"	60 ch	43 -
13' 00"	"	
13' - - -	tried	
23	150	
30	140	
40	120	
50	105	
1) 14' -- 00	90	
15	82	
30	71	
45	62	
2) 15' -- 00	54	
15	47	
30	44	
3) 16' -- 00	34	
30	29	
4) 17' -- 00	26	
30	23	
5) 18' -- 00	20	
30	18	
6) 19' -- 00	16	
30	14	
7) 20 -- 00	13	
8) 21 -- 00	11	
9) 22 -- 00	9	
10) 23 -- 00	8	
11) 24 -- 00	7	

5th charge | 6th charge | C7 C

9h 29' 00"	60 ch	45 obs
41' 00"	60 "	40 "
41' - - -	tried	0 "
23	150	
30	130	
40	115	
50	100	
1) 42' -- 00	90	
15	79	
30	68	
45	58	
2) 43' -- 00	52	
30	42	
3) 44' -- 00	33	
30	28	
4) 45' -- 00	25	
30	21	
5) 46' -- 00	18	
30	16	
6) 47' -- 00	14	
30	12	
7) 48' -- 00	11	
8) 49' -- 00	9	
9) 50 -- 00	7 "	

10h 04' 00"	60 ch	45 obs
16' 00"	60 "	39 "
16' - - -	tried	0 "
23	150	
30	140	
40	120	
50	95	
1) 17' -- 00	87	
15	76	
30	70	
45	61	
2) 18' -- 00	56	
30	[illegible]	
3) 19' -- 00	37	
30	30	
4) 20' -- 00	26	
30	22	
5) 21' -- 00	19	
30	17	
6) 22' -- 00	15	
30	13	
7) 23 -- 00	11	
8) 24 -- 00	9	
9) 25 -- 00	7	

20 [illegible] Zn Cl
15 " [illegible] Cl
15 " [illegible] of [illegible]

C & C

11h 02' 00" - 60 ch 53 ohms
12 00" - 60 " 48 "
12 - 50 - disch
60 15 "
30 11 "
40 - 9 "
50 - 6 "

[illegible] later

11h 23' 00" - 60 ch 51 ohms
33 - 00 60 " 47 "
33 - 7 - 14
[illegible] - 11
20 - 9

[illegible] [illegible] [illegible] [illegible]
not [illegible]
Previous [illegible] e.p.

Previous solution [illegible]. [illegible] 1st June [illegible]

C & C

10h 33' 00" - 60 ch 51 ohms
43 00" - 60 - - 47 "
43' - 3 26 disch
10 - 16
20 - 11
30 - 9
40 - 8
50 - 8
1) 44' - 00 - 7
15 - 6
30 - 6

4th ch.

10h 50' 00" - 60 ch - 48 ohms
11h 00' 00" - 60 " 48 "
00 - 00 disch 0
10 - 17
20 - 13
30 - 10
40 - 9
50 - 8
01 - 00 - 8
15 - 7
30 - 6

7th charge of plates as all given on p. 159.

10h 11' 00" - 60 ch 43 ohms
21' 00" - - " 34 "
21' - - 150 disch 0 "
10 150
20 150
[illegible] 135
40 115
50 95
1) 22' 00 55
15 78
30 - 30
45 - 58
2) 23 - [illegible] 52
[illegible] 41
3) 26 - 00 - 35
30 - 27
4) 28 - 00 - 22
30 - 19
5) [illegible] 10 - 16
30 - 13
6) 37 - 00 - 12

$\frac{4}{67}$. Fresh solution (cum. turbance of C.+C)

2° night	5h	12 [illegible]	60 ch	49 ohms
		22 [illegible]	60	45 "
		32 – 4	11 [illegible]	
		15 – 7		
		30 – 6		
		30 – 6		
		40 – 5		

$\frac{4}{64}$/7. Turbance of [illegible] [illegible] [illegible] [illegible] [illegible] O.+C.

1° night	3h	33 [illegible]	60 ch	46 ohms	
		43 [illegible]	"	42 "	We [illegible]
		43 – [illegible]		0 "	
		11	150		The turbance
		20	120		of [illegible]
		30	90		of antimony
		40	71		[illegible]
		50	56		is 3.0.
	4)	44 – 00	44		
		15	38		
		30	32		
		45	26		
	5)	45 – 00	23		
		15	20		
		30	18		
	3.)	46 – 30	14		
		30	11		

$\frac{4}{68}$ Previous plates and
Previous solution to which is added [illegible]

3° night	3h 56	00 –	60 ch	45 ohms	[illegible]
	4h 06	30 –	60 "	39 "	
	06	–	[illegible]	0	
		15 – 150			
		20 – 110			
		30 – 96			
		40 – 67			
		50 – 56			
	4) 09	00 – 43			
		15 – 34			
		30 – 29			
		45 – 23			
	3.) 58	00 – 19			
		30 – 15			
	3.) 07	00 – 12			
		30 – 10			
	10	00 – 5			

#69 – Lead [illegible] ------ 60 grms ±
aqua pura ------ 70 " ±
Hydrochloric ac ------ 20 " ±
Nitric acid ------ 3 " ±
Manganese Chloride 15 " ±
Zinc Chloride 25 " ±

Carbon & Carbon

1° night

4h 21' 00" – 60 ch | 4.3 hrs
31' 00" – 60 "
31' --- disch 0
24 – 150
30 – 130
40 – 110
30 – 92
1.) 37' – 00 – 74
15 – 58
30 – 46
45 – 38
2.) 33' – 00 – 32
15 – 26
30 – 23
3.) 34' – 00 – 19
30 – 15
4.) 35' – 00 – 13
30 – 11
5.) 36' – 00 – 10
30 – 9
6.) 37' – 00 – 8
30 – 7
7.) 38' – 00 – 7

Previous plates used.

Probably less trichloride of antimony than in the former solution as in 66! 159–163

2nd charge

4h 40' 00" – 60 ch 41 ch
50' 00" – " " 39 "
50' --- disch 0 "
24 – 150
30 – 135
40 – 115
30 – 92
1.) 51' – 00 – 79
15 – 64
30 – 52
45 – 44
2.) 52' – 00 – 38
15 – 33
30 – 29
45 – 26
3.) 53' – 00 – 23
15 – 21
30 – 19
4.) 54' – 00 – 16
30 – 14
5.) 55' – 00 – 12
30 – 11
6.) 56' – 00 – 10
30 – 9
7.) 57' – 00 – 9

3rd charge

4h 59' 00" – 60 [illegible]
5h 9' 00" – 60 " 37 "
9' --- disch 0
24 – 150
30 – 135
40 – 110
30 – [illegible]
1.) 10' – 00 – 81
15 – 65
30 – 55
45 – 46
2.) 11' – 00 – 39
15 – 35
30 – 31
45 – 27
3.) 12' – 00 – 24
15 – 22
30 – 20
45 – 19
4.) 13' – 00 – 18
30 – 16
5.) 14' – 00 – 14
30 – 12
6.) 15' – 00 – 11
30 – 10
7.) 16' – 00 – 9
30 – 9

#69 – Part of previous sol + 30% new Chlorine of Sb
fresh Carbons.

nothing 5 L 15 w? [illegible] 37 ohm
35' [illegible] 30 "
20' – 10.105 [illegible] 0 "
[illegible]
30 – 94 "
40 – 76
30 – [illegible]
[illegible] – 60 – 75 "
15 – 63
30 – 54
45 – 45
2.) 35' – 60 – 43
15 – 36
30 – 32
45 – 27
3.) 31' – 60 – 25
30 – 21
4.) 31' – 60 – 17
30 – 15
5.) 33' – 60 – 13
30 – 12
6.) 34' – 60 – 11
30 – 10
7.) 35' – 60 – 9

No gas given off

This test is made to determine if the addition of above refining methods is beneficial. In this test there is a smaller exposure of carbon.

A decided improvement is shown, due to stronger antimony solution.

#69 – 2nd charge of preceding cell.

9 L 15 w? [illegible] 30 ohm
29' – 60 " 30 "
90' – [illegible] "
10 – 120
30 – 92
30 – 87
40 – 81
50 – 77
1.) 30' – 60 – 76
15 – 71
30 – 66
2.) 31' – 60 – 57
30 – 47
3.) 32' – 60 – 39
30 – 30
4.) 33' – 60 – 28
30 – 18
5.) 34' – 60 – 15
30 – 13
6.) 35' – 60 – 12
30 – 11
7.) 36' – 60 – 10
30 – 9

Treatment 30% of above
3rd charge

9 L 29 w? [illegible] 30 ohm [illegible]
57 [illegible]
57 [illegible]
6 – 75
30 – 90
30 – 86
40 – 80
50 – 77
1.) 60' – 60 – [illegible]
15 – 69
30 – 64
2.) 61' – 60 – 57
30 – 46
3.) [illegible] – 60 – 35
30 – 30
4.) [illegible] – 30 – 25
30 – 21
5.) 64' – 60 – 17
30 – 16
6.) [illegible] – 60 – 14
30 – 12
7.) 66' – 60 – 11
30 – 11
37 – 60 – 10

[illegible]/69 – Previous solution + 20% [illegible] [illegible]
[illegible] – [illegible] carbons

1st charge | 2nd [illegible]

10h [illegible] [illegible] ch. 400 ohms | [illegible] [illegible] 30 [illegible]
[illegible] 25 " | 57 [illegible] 30 "
87 [illegible] [illegible] 0 " | [illegible] [illegible] 0 "

1st charge		2nd charge	
	6 – 150		10 – 115
	20 – 135		20 – 105
	30 – 115		30 – 100
	40 – 105		40 – 94
	50 – 96		50 – 85
1.) 35'	60 – 77	1.)	[illegible] – 77
	15 – 72		15 – 70
	30 – 63 Compared		[illegible] – 64
	[illegible] with p. 159		
2.) 47'	[illegible] – 46	2.)	[illegible] – 53
	[illegible] – 42		30 – 41
	[illegible] – 36		
3.) [illegible]	[illegible] – 27 Compared	3.)	[illegible] – 32
	30 – [illegible] with p. 170		30 – 23
4.) [illegible]	[illegible] – [illegible]	4.)	65' [illegible] – 20
	[illegible] – 16		30 – [illegible]
5.) [illegible]	60 – 14	5.)	60' [illegible] – 16
	30 – 12		30 – 14
6.) 43'	60 – 11	6.)	65' 60 – 12
	30 – 10		30 – 11
7.) 44'	60 – 9	7.)	66' 60 – 10
	30 – 9		30 – 10

[illegible] [illegible] better [illegible] [illegible] [illegible] [illegible] [illegible] a [illegible]. [illegible] increase in [illegible] of plates.

[illegible]/69 – Previous solution + 10% Manganese Chloride
Same carbon plates!

1st charge – | 2nd charge

11h 21' [illegible] 60 ch. 300 ohms | 11h 51' [illegible] [illegible]
31' [illegible] " 31 " | 12h [illegible] [illegible] 32 "
31' [illegible] [illegible] 0 | [illegible] 0

1st charge		2nd charge	
	30 – 150		10 – 125
	45 – 140		20 – 117
	50 – 75		30 – 110
1.) 32'	[illegible] – 105		40 – 105
	15 – 86		50 – 93
	30 – 70 agitation	1.)	[illegible] 60 – 92
	45 – 56		15 – [illegible]
2.) 33	60 – 45 [illegible]		30 – 75
	15 – 32 [illegible]		[illegible] – 67
	30 – 29 [illegible]	2.)	[illegible] 60 – 59
3.) 34'	60 – 22 [illegible]		15 – 50
	30 – 16 discharge		30 – 46
4.) 35'	60 – 13	3.)	[illegible] 60 – 35
	30 – 11 Plates		30 – 26
5.) 36'	60 – 9 immersed about 2/3	4.)	[illegible] 60 – 20
	30 – 8		30 – 18
6.) 37'	60 – 7	5.)	56' 60 – 16
	30 – 7		30 – 14
7.) 38'	60 – 6	6.)	[illegible] 60 – 12
			30 – 10
		7.)	58' 60 – 9

3rd charge | 4th charge | C + C

3rd charge	4th charge
1h 39'.00" 60 ch. 35 ohms	2h 08'.00" 60 ch. 35 ohms
49'.00" 60 " 31 "	11'.00" 60 " 30 "
49 ... switch 0	15 switch 0
6.94 "	10.95
10.91	20.90 "
20.89	30.88
30.87	40.86
40.85	50.81
50.81	1.) 9'.00" 79
1.) 50'.00" 78	15 77
15 74	30 73
30 70	40 68
45 69	2.) 20'.00" 62
2.) 51'.00" 64	15 56
15 57	30 54
30 52	45 50
3.) 52'.00" 42	3.) 21'.00" 47
30 35	30 40
4.) 53'.00" 29	4.) 22'.00" 33
30 23	30 27
5.) 54'.00" 19	5.) 23'.00" 23
30 16	30 20
6.) 55'.00" 14	6.) 24'.00" 17
30 12	30 14
7.) 56'.00" 11	7.) 25'.00" 12
30 10	30 11
8.) 57'.00" 9	26'.00" 11

#69 Previous solution + 15% more urine alone - square plates.

1st charge	2nd charge
3h 46'.00" 60 ch. 35 ohms	3h [illegible] 60 ch. 35 ch.
55'.00" 60 " 31 "	[illegible] 60 " 26 "
56 ... 6 switch 0	[illegible]
10.96	10.98
20.92	20.72
30.88	[illegible] 70
50.85	[illegible] 70
1.) 57'.00" 81	4.) [illegible] 00 61
15 77	15 [illegible]
30 72	30 60
45 66	45 [illegible]
2.) 58'.00" 61	[illegible]
30 53	30 [illegible]
3.) 59'.00" 40	[illegible] 50
30 36	[illegible]
4.) 00'.00" 32	25 [illegible] 37
30 26	30 [illegible]
5.) 01'.00" 19	[illegible] 00 [illegible]
30 16	30 [illegible]
6.) 02'.00" 14	27 [illegible] 20
30 12	30 16
7.) 03'.00" 10	[illegible]
30 8	[illegible] 15
8.) 04'.00" 7	[illegible] 11
30 7	30 10
9.) 05'.00" 6	[illegible] 9
14.) 10'.00" 2	13.) 30 [illegible] 5

Carbon cloth replaced = 1¾ × ¾ c/m

Probably too much [illegible]

3rd charge | 4th charge | 5th charge | 6th charge

3rd charge		4th charge		5th charge		6th charge	
3h 41' 00" 20 ch	38 ohms	4h 11' 00" 20 ch	33 ohms	4h 33' 00" 20 ch	31 ohms	4h 57' 00" 20 ch	31 ohms
57' 00" 20 "	28 "	21' 00" 20 "	27 "	35' 00" 20 "	26 "	5h 38' 00" 20 "	25 "
59' ...	"	51' ...	"	43 ...	"	...	"
10.63		5.59		10.58		10.57	
20.62		10.58		20.57		20.57	
30.61		40.57		30.57		30.57	
...60		40.58		40.56		40.56	
50.60		20.57		1.) 44 ... 00.56		50.56	
1.) 56' 00.60		50.57		15.58		1.) 4' 00.55	
15.59		1.) 00 00.57		30.55		15.55	
30.58		15.56		45.54		30.55	
45.57		30.56		2.) 45 ... 00.54		45.53	
2.) ...00.56		2.) 23 ... 00.54		15.53		2.) 20' 00.53	
15.55		30.52		30.52		15.52	
30.54		3.) 24 00.49		3.) 46' 00.50		30.51	
3.) 54' 00.51		30.46		30.48		3.) ... 00.49	
30.45		4.) 25' 00.41		4.) 47' 00.45		30.47	
4.) 55 00.40		30.34		30.40		... 00.46	
30.35		5.) 26' 00.33		5.) 48' 00.35		30.41	
5.) 56 00.32		30.29		30.31		00.36	
30.26		6.) 27' 00.25		6.) 49' 00.29		30.33	
6.) 57' 00.23		30.22		30.25		... 00.28	
30.20		7.) 28' 00.19		7.) 50 ... 00.24		30.25	
7.) 58' 00.16		30.17		30.20		7.) ... 00.22	
30.16		8.) 29' 00.15		8.) 51' 00.18		30.20	
8.) 59' 00.13		30.13		30.15		8.) 16 00.18	
30.11		9.) 30' 00.11		9.) 52' 00.13		30.16	
9.) 00 00.10		30.10		30.12		9.) 17' 00.14	
30.9		10.) 31 00.9		10.) 53' 00.11		30.13	
10.) 01 30.9		30.9		12.) 55 00.8		10.) 18 00.11	
11.) 02 00.7		11.) 32 00.8				12.) 20 00.9	
						14.) 22 00.6	

Wednesday 1st July, [illegible]

#69 – Continuation of Previous Tests

7th Charge | 8th Charge

Time	Defl.	Extra Resistance	Time	Defl.	Extra Res.
9h 10' 00"	60 cl	420 ohms	9h 46' 00"	60 cl	30 oh
30 00	60	96 "	56 00	60	60 "
12	dscl	0 "	56	dscl	0 "
10	46	" "	10	44	
30	43		20	43	
30	42		30	43	
40	40		30	42	
50	40		57	60 42	" "
1) 30'	40	" "	15	42	
15	40		30	42	
30	40		2) 57	60 42	
2) 2[illegible]	60 40		[illegible]	41	
30	40		3) 59'	41	" "
3) 25	60 37	" "	30	40	
30	37		4) 00'	60 39	
4) 26'	60 37		30	38	
30	37		5) 01	60 36	
5) 27	60 35		30	30	
30	31		6) 02'	60 36	" "
6) 28	60 27	" "	30	30	
30	25		7) 03	60 27	
7) 29	60 33		8) 04	60 22	
30	21		9) 05	60 19	" "
8) 30'	60 18		10) 06	60 15	
9) 31	60 15	" "	12) 08	60 60	
10) 32	60 11		15) 11	60 6	
12) 34	60 7				

#69 – 9th Charge | 10th Charge

Time	Defl.	Extra Res.	Time	Defl.	Extra Res.
10h 16' 00"	60 cl	30 ohms	10h 46' 00"	60 cl	29 ohm
[illegible] 00	60	22 "	56' 00	60	21 "
[illegible]	dscl	0 "	[illegible]	dscl	"
[illegible]	43	" "	[illegible]	45	" "
20	43		[illegible]	45	
30	43		[illegible]	45	
1) 27'	60 43	" "	57	60 45	" "
30	43		30	45	
2) [illegible]	60 43		[illegible]	60 [illegible]	
30	42		[illegible]	[illegible]	
3) 29	60 42	" "	57	60 43	" "
30	41		[illegible]	42	
4) [illegible]	60 40		[illegible]	[illegible]	
30	38		[illegible]	[illegible]	
5) 31'	60 36		6) [illegible]	[illegible]	
30	34		[illegible]	34	
6) 32	60 32	" "	[illegible]	60 3[illegible]	" "
30	30		30	[illegible]	
7) [illegible]	60 28		[illegible] 03	60 27	
[illegible]	25		[illegible]	[illegible]	
8) 34'	60 23		[illegible] 04	[illegible]	
30	21		[illegible]	20	
9) 35	60 19	" "	[illegible]	17	" "
10) 36'	60 15		06	[illegible]	
11) 37'	60 13		07	[illegible]	
12) 38	60 11	" "	[illegible]	10	" "
13) 39	60 9		13) 09	60 9	
15) 41	60 7	" "	15) 11	60 7	" "
17) 43	60 5		17) 13	60 5	

11th charge

11h 33' 00" 4 cells 300 ohms
33' 00" 20 " 22
33' ... 4 cell
10 46
30 46
30 46
1) [illegible] 00 46
30 46
2) 35' 00 45
30 45
3) 36' 00 44
30 42
4) [illegible] 00 40
[illegible] 39
5) [illegible] 36
30 34
6) [illegible] 00 31
30 27
7) 40' 00 24
8) 41' 00 21
9) [illegible] 00 18
10) 43' 00 14
11) 44' 00 [illegible]
12) 45' 00 10
13) 46' 00 8
15) 48' 00 6
17) 50' 00 5

12th charge

12h 0' 00" 4 cells 290 ohms
14' 00" 20 " 2 cells
14' ... 4 cells
10 50
30 50
1) 15' 00 50
30 49
45 48
2) 16' 00 47
30 46
3) 17' 00 45
30 44
4) 18' 00 42
30 40
5) 19' 00 38
30 35
6) 20' 00 32
30 [illegible]
7) 21' 00 27
8) 22' 00 22
9) 23' 00 18
10) 24' 00 14
11) 25' 00 11
12) 26' 00 10
13) 27' 00 8
15) 29' 00 7

13th charge

1h 57' 00" 4 cells 310 ohms
2h 07' 00" 20 " 23 "
7' ... 4 cells 0 "
10 51
30 51
30 51
1) [illegible] 00 51
30 50
2) 09' 00 50
30 49
3) [illegible] 00 47
30 45
4) [illegible] 00 43
30 40
5) [illegible] 00 38
30 35
6) [illegible] 00 30
30 26
7) [illegible] 00 23
30 20
8) 15' 00 18
9) 16' 00 15
10) 17' 00 12
11) 18' 00 10
12) 19' 00 8
13) 20' 00 7
15) 22' 00 5

14th charge.

2h 49' 00" 60 ohms 270 ohms
49' 00 [illegible]
5' [illegible]
10 52
[illegible]
[illegible]
1) [illegible] 00 52
30 51
2) [illegible] 51
30 50
3) [illegible] 00 49
30 47
4) [illegible] 00 45
30 42
[illegible] 37
30 [illegible]
6) [illegible] 00 [illegible]
30 25
7) [illegible] 00 [illegible]
30 22
8) 47' 00 [illegible]
9) 48' 00 16
10) 49' 00 13
11) [illegible] 00 11
12) 51' 00 9
13) [illegible] 00 8
15) 54' 00 7

#69 C

Ant. perchloride ... 15 %
Uranium in chloride .. 10 %
Lime .. 16 %
Hydrochloric acid .. 8 %
Water .. 20 %
Salicylic acid .. 1 %

[illegible] entirely new [illegible] 10% [illegible] solution

1st charge – 10 minutes

3h 33' [illegible] 60 [illegible] 33 ohms
33' [illegible] 27 "
33' [illegible] "
10 – 120 " " "
20 – 110
30 – 105
50 – 105
1.) 34 – 00 – 100 " " "
30 – 92
2.) 35 – 00 – 70
30 – 70
3.) 36 – 57
4.) 37 – 00 – 45
5.) 38 – 00 – 29
6.) 39 – 00 – 21 " " "
7.) [illegible] – 16
8.) 41 – 00 – 12
9.) 42 – 00 – 9 " " "
10.) 43 – 00 – 7
11.) 44 – 00 – 7
12.) 45 – 00 – 7
15.) 48 – 00 – 5 " " "

2nd charge

4h 16' 00 – 60 of 35 ohms
26' 00 – 60 – 26 "
26' [illegible] "
10 – 105 " "
20 – 102
30 – 100
40 – 96
1.) 27 – 00 – 91 " " "
30 – 84
2.) 28 – 00 – 75
30 – 67
3.) 29 – 00 – 58 " "
4.) 30 – 00 – 40
5.) 31 – 00 – 29
6.) 32 – 00 – 22 " " "
7.) 33 – 00 – 16
8.) 34 – 00 – 13
9.) 35 – 00 – 10 " " "
10.) 36 – 00 – 9
11.) 37 – 00 – 7
14.) 38 – 00 – 7 " " "
15.) 41 – 00 – 5 " "

3rd charge

4h 45' 00 – 60 [illegible] 3[illegible] ohms
55' 00 – 60 " 26 "
55' [illegible] " "
[illegible] – 104 " " "
20 – 100
30 – 95
40 – 90
1.) 56 – 00 – 86 " " "
15 – 84
30 – 81
2.) 57 – 00 – 76
30 – 67
3.) 58 – 00 – 58 " " "
30 – 50
4.) 59 – 00 – 43
5.) 00 – 00 – 32
6.) 01 – 00 – 25 " " "
7.) 02 – 00 – 20
8.) 03 – 00 – 15
9.) 04 – 00 – 11 " " "
10.) 05 – 00 – 9
11.) 06 – 00 – 8
12.) 07 – 00 – 7 " " "
13.) 08 – 00 – 7
15.) 10 – 00 – 6 " " "

4th charge

5h 15' 00 – 60 [illegible] 3[illegible] ohms
25' 00 – 60 " 2[illegible] "
[illegible] " "
[illegible] 102 " " "
[illegible] 100
[illegible] 95
[illegible] 91
1.) 29 – 00 – 90 " " "
15 – 87
[illegible] 82
2.) 30 – 00 – 77
30 – 69
3.) [illegible] 61 "
30 – [illegible]
4.) 32 – 00 – [illegible]
5.) [illegible]
6.) [illegible] 26 " "
7.) [illegible]
8.) [illegible] 17
9.) 37 – 00 – 13 " " "
10.) 38 – 00 – 11
11.) [illegible] 9
12.) [illegible] 8 " "
13.) [illegible] 8
15.) [illegible] 7 " "

Thursday 2nd July

5th charge –

9h 14' av. — ch 340 hms
44' av. — 56 "
44' — each 0 "
10 — 93 " " "
20 — 90
30 — 89
40 — 87
50 — 75
1) 25' — 60" — 82 " " "
15 — 79
30 — 76
2) 26 — 60 — 71
30 — 64
3.) 27' — 60 — 57 " " "
30 — 49
4) 28' — 60 — 43
5) 29 — 60 — 32
6) 30 — 60 — 24 " " "
7) 31 — 60 — 17
8) 32 — 60 — 13
9) 33 — 60 — 11 " " "
10) 34 — 60 — 9
11) 35 — 60 — 8
12) 36 — 60 — 7 " " "

6th charge –

9h 47' av. — ch. 300 hms
57' av. — " 34 "
57' — each 0 "
10 — 93 " " "
20 — 90
30 — 88
40 — 66
50 — 85
1) 58 — 60" — 82 " " "
15 — 80
30 — 77
2) 59' — 60 — 71
30 — 66
3) 10 — 60 — 60 " " "
30 — 56
4) 01' — 60 — 47
5) 02' — 60' — 36
6) 03 — 60 — 27 " " "
7) 04 — 60 — 23
8) 05 — 60 — 18
9) 06 — 60 — 15 " " "
10) 07 — 60 — 11
11) 08 — 60 — 9
12) 09 — 60 — 7
13) 12 — 60 — 5

7th charge –

10h [illegible] av. — each 290 hms
57' av. — " 83 "
57' — each 0 "
10 — 95 "
20 — 92
30 — 89
40 — 85
50 — 86
1) 21 — 60 — 84 " " "
15 — 81
30 — 75
2) 31 — 60 — 73
30 — 66
3) [illegible] — 60 — 60 " " "
30 — 53
4) 3[illegible] — 60 — 47
5) 3[illegible] — 60 — 3[illegible]
6) 33 — 60 — [illegible] " " "
7) 34 — 60 — [illegible]
8) 35 — 60 — 19
9) 36 — 60 — 15 " " "
10) 37 — 60 — 11
11) 38 — 60 — 9
12) 39 — 60 — 8
13) 42 — 60 — 5

8th charge –

10h 54 av. — each 29 hms
11h 04 av. — " 84 "
04 — each [illegible] "
10 — 97 " " "
20 — [illegible]
30 — 92
40 — 90
50 — 87
1) [illegible] — 60 — 81 " " "
15 — 81
30 — [illegible]
[illegible] — 60 — [illegible]
30 — 66
3) [illegible] — 60 — 58 " " "
30 — [illegible]
[illegible] — 60 — [illegible]
[illegible] — 60 — 3[illegible]
[illegible] — 60 — [illegible] " " "
11 — 60 — 23
[illegible] — 60 — [illegible]
[illegible] — 60 — 15 " " "
10) [illegible] — 60 — 10
[illegible] — 60 — 9
12) [illegible] — 60 — 8
15) [illegible] — 60 — 5

9th charge – 10'

11h 35' ao" – Koch [illegible]
45' ao" – [illegible] " 23 "
45' – – – [illegible] 0 "
10 – 98
20 – 86
30 – 13
40 – 92
50 – 88
1) 46 – 00 – 76
15 – 82
30 – 79
2) 47 – 00 – 70
30 – 67
3) 48 – 00 – 60
30 – 52
4) 49 – 00 – 41
5) 50 – 00 – 33
6) 51 – 00 – 28
7) 52 – 00 – 23
8) 53 – 00 – 18
9) 54 – 00 – 13
10) 55 – 00 – 10
11) 56 – 00 – 8
12) 57 – 00 – 7

10th charge (?)

12h 07' ao" – Koch [illegible]
17' ao" – [illegible] " 31 "
17' – – – [illegible] 0 "
10 – 99
20 – 98
30 – 95
40 – 92
50 – 90
1) 18 – 00 – 88
15 – 84
30 – 81
2) 19 – 00 – 76
30 – 69
3) 20 – 00 – 62
30 – 54
4) 21 – 00 – 48
5) 22 – 00 – 40
6) 23 – 00 – 30
7) 24 – 00 – 24
8) 25 – 00 – 20
9) 26 – 00 – 18
10) 27 – 00 – 16
11) 28 – 00 – 14 ?
12) 29 – 00 – 11
13) 30 – 00 – 9
14) 31 – – – 7

11th charge

12h 45' ao" – Koch [illegible]
45' ao" – [illegible] " [illegible]
55' – – [illegible] ao.
[illegible] 100
20 – 97
30 – 96
40 – 91
50 – 90
1) 56 – 00 – 85
15 – 85
30 – 80
2) 57 – 00 – 74
30 – 66
3) 58 – 00 – 59
30 – 51
4) 59 – 00 – 44
5) 00 – 00 – 35
6) 01 – 00 – 26
7) 02 – 00 – 21
8) 03 – 00 – 17
9) 04 – 00 – 14
10) 05 – 00 – 11
11) 06 – 00 – 9
12) 07 – 00 – 7
13) 08 – 00 – 5

12th charge

1h 25' ao" – Koch [illegible]
[illegible] ao" – [illegible]
[illegible]
[illegible] 98
[illegible] 97
[illegible] 93
40 – 91
50 – 90
[illegible] – 88
15 – 82
30 – 80
2) 40 – 00 – 72
30 – 66
3) 41 – 00 – 58
30 – 49
4) 42 – 00 – 43
5) 43 – 00 – 38
6) 44 – 00 – 36
7) [illegible] – 31
8) [illegible] – 17
9) [illegible] – 14
10) [illegible] – 10
11) [illegible] – 7
12) [illegible] – 6
13) [illegible] – 5
14) 53' – 00 – 4

 20 minutes' charge —

13th + 14th charges of 10'	15th + 16th charges
3h 29' 00" .. 60 ch 25 ohms	3h 30' 00" .. 60 ch 26 ohms
39' 00" .. 60 " 20 "	40' 00" .. 60 " 19 "
49' 00" .. 60 " 17 "	50' 00" .. 60 " 15 "
49' ...... level 0 "	50' ...... discharge 0 "
10 .. 102 "	10 .. 103 "
20 .. 100	20 .. 102
30 .. 100	30 .. 101
45 .. 98	45 .. 98
1.) 51' 00" .. 96	1.) 51' 00" .. 96
30 .. 92	30 .. 92
2.) 51' 00" .. 90	2.) 52' 00" .. 79
30 .. 86	30 .. 76
3.) 52' 00" .. 81	3.) 53' 00" .. 73
4.) 53' 00" .. 72	4.) 54' .. 72
5.) 54' 00" .. 62	5.) 55' .. 54
6.) 55' 00" .. 54	6.) 56' .. 55
7.) 56' 00" .. 47	7.) 57' .. 49
8.) 57' 00" .. 38	8.) 58' .. 42
9.) 58' 00" .. 32	9.) 59' .. 35
10.) 59' 00" .. 29	10.) 00' 00" .. 31
12.) 01' 00" .. 21	12.) 02' 00" .. 23
14.) 03' 00" .. 17	14.) 04' .. 18
16.) 05' 00" .. 12	16.) 06' 00" .. 14
18.) 07' 00" .. 8	18.) 08' 00" .. 9
20.) 09' 00" .. 6	20.) 10' 00" .. 7
22.) 11' 00" .. 5	22.) 12' 00" .. 6
25.) 14' 00" .. 4	25.) 15' 00" .. 4

30 minutes charge —

17th, 18th + 19th charges of 10'	
4h 25' 00" .. 60 ch 24 ohms	22.) 20' 00" .. 15
35' 00" .. 60 " 17 "	24.) 22' 00" .. 12
45' 00" .. 60 " 14 "	26.) 24' 00" .. 9
55' 00" .. 60 " 12 "	28.) 26' 00" .. 7
55' ...... level 0 "	30.) 28' 00" .. 6
10 .. 103	32.) 30' 00" .. 6
20 .. 101	34.) 32' 00" .. 5
30 .. 100	
45 .. 99	
1.) 57' 00" .. 98	
30 .. 97	
2.) 58' 00" .. 93	
30 .. 90	
3.) 01' 00" .. 87	
4.) 02' 00" .. 81	
5.) 03' 00" .. 73	
6.) 04' 00" .. 67	
7.) 05' 00" .. 60	
8.) 06' 00" .. 55	
9.) 07' 00" .. 49	
10.) 08' 00" .. 45	
12.) 10' 00" .. 37	
14.) 12' 00" .. 30	
16.) 14' 00" .. 24	
18.) 16' 00" .. 21	
20.) 18' 00" .. 18	

30" minute charge Friday, 3rd Aug.

20th 21st + 23rd 10' charge

9h 06' 00" kl d 30 div
13' 00" 00 " 20 "
56' 00" 00 " 13 "
[illegible] 00" 00 " 10 "
[illegible] discharge 0 "
[illegible].92 " " "
[illegible].91
30.90
[illegible].89
1) 39 [illegible] 79 " " "
15.88
[illegible].87
2) 40' 00 84
30 81
3) [illegible] 00 79
30 77
4) 40 00 74
5) 43 00 70
6) 44 00 63
7) 45 00 57
8) 41 00 52
9) 47 00 47
10) 46 00 42
11) 49 00 37

12) 50 00 32 " "
13) [illegible] 00 29
14) 51 00 25
15) 52 00 25
16) 53 00 21
17) [illegible] 00 [illegible]
[illegible] 50 00 14
[illegible] 00 00 10
[illegible] [illegible] 00 7
[illegible] [illegible] 00 6
[illegible] [illegible] 00 6
32) [illegible] 00 5

24th 10' charge

10h 26' 00" 00 on 20 div
36' 00" 00 " 13 "
[illegible] discharge 0 "
10.92 " " "
[illegible] 89
[illegible] 87
40.85
[illegible] 83
1) 37 00 81 " " "
5 78
[illegible] 75
2) [illegible] 00 70
30 [illegible]
3) 37 00 57 " " "
30 53
4) 42 00 47
5) 44 00 37
6) 42 00 29 " " "
7) 43 00 25
8) [illegible] 00 20
9) 45 00 17 " " "
10) 46 00 14
12) 48 00 9 "
14) 50 00 6 "

25th 10' charge

11h 05' 00" 00 on 17 div
15' 00" 00 " 9 "
[illegible] discharge 0 "
[illegible]92 " "
[illegible] 90
[illegible] 88
[illegible] 86
[illegible] 80
1) [illegible] 00 82 " " "
15 [illegible]
30 77
2) [illegible] 00 71
30 63
3) 17' 00 58 " " "
30 53
4) [illegible] 00 47
5) [illegible] 00 39
6) [illegible] 00 33 " "
7) [illegible] 00 23
8) [illegible] 00 19
9) [illegible] 00 16
10) [illegible] 00 13
[illegible] [illegible] 00 9
[illegible] 29 00 6

5" minutes charges.

25½th charge

11h 40' 00" – 60 ch. 110 ohms
45' 00" – 60 " 11 "
45' – – – disch. 0 "
10 – 90
20 – 66
30 – 70
40 – 76
50 – 71
1.) 46 – – 68
[illegible] – 62
[illegible] – 53
2.) 47 – – 00 – 41
30 – 34
3.) 48 – – 00 – 28
30 – 23
4.) [illegible] – 00 – 20
5.) [illegible] – 15
6.) 51' – – – 10
7.) 52 – 00 – 7
8.) 53 – 00 – 5
9.) 54 – 00 – 5
10.) 55 – 00 – 4

26th charge

12h 08' 00" – 60 ch. 110 ohms
14 00" – 60 " 10 "
14 – – – disch. 0 "
10 – 90
20 – 76
30 – 74
40 – 70
50 – 77
1.) 10' – 00 – 73
15 – 68
30 – 64
2.) 16 – 00 – 54
30 – 41
3.) 17 – 00 – 35
30 – 30
4.) 18 – 00 – 26
5.) 19 – 00 – 21
6.) 20 – 00 – 15
7.) 21 – 00 – 11
8.) 22 – 00 – 8
9.) 23' – 00 – 6
10.) 24 – 00 – 5

5" minutes charges 11/27

26½th charge

1h 52' 00" – 60 ch. 190 ohms
57' 00" – 60 " 13 "
57' – – – disch. 0 "
10 – 91
20 – 87
30 – 82
40 – 78
50 – 74
1.) 58 – 00 – 70
15 – 62
30 – 53
2.) 59' – 60 – 47
30 – 35
3.) 00' – 00 – 27
30 – 21
4.) 01' – 00 – 17
5.) 02 – 00 – 12
6.) 03 – 00 – 8
7.) 04 – 00 – 6
8.) 05 – 00 – 5
9.) 06 – 00 – [illegible]
10.) 07 – 00 – 4

[illegible] charge

2h 41' 00" – 60 ch. [illegible]
46' 00" – 60 " [illegible] "
[illegible] – – – disch. [illegible]
10 – 96
20 – 92
30 – 85
40 – 80
50 – 75
1.) 47 – – – 72
[illegible] – 63
[illegible] – 49
2.) 48 – 00 – 40
[illegible] – 32
3.) 49 – 00 – 27
30 – 21
4.) 50' 00" – 16
5.) 51 00 – 10
6.) 52 00 – 8
7.) 53' 00" – 7
8.) 54 – 00 – 5
9.) 55' 00" – 4

~~Monday~~ 6th July, 1885

Determination Resist. of cell

Using one standard Daniell cell

Resist of Daniell cell & galvan. given by

$C_1 = \frac{E}{G+R} = 88$ on scale

$C_2 = \frac{E}{G+R+5} = 43$ " "

$\therefore G+R = \frac{5 \times 43}{88 - 43} = 4.8$ ohms

Let E = E.M.F. of standard cell = 1.079

E' = " " secondary cell when nearly discharged

& r = resist of secondary cell

Then $C_3 = \frac{E - E'}{4.8 + r} = 17$

$C_4 = \frac{E + E'}{4.8 + r} = 23 \quad \therefore E' = .15 E = .16$ volts

and $r = 3.5 \pm$ ohms

Determination of resistance of cell at different periods of discharge by introducing a known resistance momentarily. Known resist = 5 ohms

"5" minutes charge

Time of Discharge	Reading	Extra resist	Reduced Reading	Resistance of cell
10h 05' 10"	46	0		
20	90	0		
30	35	5 ohms	85	3.2 ohms
40	83	0		
10h 06' 00	32	5 "	74	3.4 "
15	71			
25	66			
30	29	5 "	62	4.2 "
45	56			
55	46			
10h 07' 00	25	5 "	45	5.9 "
15	44			
30	39			
45	35			
10h 08' 00	19	5 "	32	6.9 "
30	28			
10h 09' 00	23			

10h 09' 35" 14 — 5 ohms 22 — 8.4 ohms
30 20
35 18
9) 10' 10 11 — 5 ohms 17 — 8.9 ohms
15 10
55 12
50 65 — 5 ohms 12 — 11.7 ohms
15 10

"5" charge #28

11h 50' .. ch charge 2 ohms
57' 00 .. 18
59' 0
10 — 0
20 — 72
30 37 — 5 ohms
12h 00 00 36
30 34
01 00 32
30 30
35 60 — 0 — 7 = 4.7 ohms
40 27 — 5
02 00 24 — 5
03 00 22 — 5
00 20 — 5
04 00 18 — 5
05 00 20 — 0

Determination of most economical charge or rate of charging.

"5" minute charges #29

1h 45' 00" .. ch 6 ohms | 1h 53' 00" .. 6 ohms
46' 00" .. 19 | 03 00 .. 15
46 .. .. 0 | 03 0
10.92 | 10 — 97
20.90 | 20 — 94
30.80 | 30 — 86
45 77 | 45 — 79
1) 47 — 00 — 69 | 1) 30 — 70
30 46 | 30 57
2) 48 00 38 | 2) 05 00 48
30 30 | 30 33
3) 49' 00 — 24 | 3) 06 00 26
30 18 | 30 22
4) 50' 00 13 | 4) 07 00 19
5) 51 00 8 | 5) 08 00 12
6) 52 00 6 | 6) 10 00 8
7) 53 00 5 | 7) 11 00 6
| 8) 11 00 5

2h 36' 00" ... ch 36 ch | 2h 56' 00" 40 ch 36 ch
41' 00" ... 31 | 3h 01' 00" 340 29
41' ... disch 0 | 01' ... disch 0
10 89 | 10 83
20 78 | 20 78
30 73 | 30 71
45 61 | 45 60
1) 42' 00 45 | 1) 02' 00 50
30 31 | 30 36
2) 43' 00 25 | 2) 03' 00 20
30 22 | 30 21
3) 44' 00 14 | 3) 04' 00 17
30 12 | 30 13
4) 45' 00 9 | 4) 05' 00" 10
30 7 | 30 8
5) 46' 00 6 | 5) 06' 00
6) ... 00 5 | 6) 07' 00 6

3h 24' 00" 50 ch 10 ch | 3h 43' 00" 50 ch 10 ch
29' 00" ... 3 | 46' 00" ... 3
29' ... disch 0 | 46' ... disch 0
10 106 | 10 106
20 107 | 20 101
30 98 | 30 98
45 92 | 45 92
1) 30' 00 76 | 1) 49' 00 74
30 75 | 30 73
2) 31' 00 61 | 2) 50' 00 62
30 48 | 30 47
3) 32' 00 35 | 3) 51' 00 37
30 26 | 30 30
4) 33' 00 21 | 4) 52' 00 25
30 18 | 30 22
5) 34' 00 17 | 5) 53' 00 17
6) 35' 00 11 | 6) 54' 00 14
7) 36' 00 8 | 7) 55' 00 11
8) 37' 00 6 | 8) 56' 00 8
9) 38' 00 5 | 9) 57' 00 7

"5" minutes charges #31½

4h 57' 00" – 30 ch 109 ch			5h 14' 00" – 30 ch 108 ch		
5h 03' 00" – 30 " 90 "			19' 00 – 30 " 104 "		
03' – – – disch 0 "			19' – – disch 0 "		
	10 – 88 " " "			10 – 86 " "	
	20 – 15			20 – 67	
	30 – 57			30 – 57	
	40 – 45			40 – 45	
1)	04' 00 – 35 " " "		1)	20' 00 – 36 " "	
	30 – 26			30 – 28	
2)	05' 00 – 19		2)	21' 00 – 21	
	30 – 14			30 – 17	
3)	06' 00 – 10 " " "		3)	22' 00 – 12 " "	
	30 – 7			30 – 8	
4)	07' 00 – 5		4)	23' 00 – 6	
	30 – 4			30 – 5	
5)	08' 00 – 4		5)	24' 00 – 4 " "	

Discharging through Extra resistance

"5" minute charges

9h 31' 00" – 40 ch 70 ch			9h 54' 00" – 40 ch 72 ch		
36' 00" – 40 " 75 "			54' 00" – 40 " 78 "		
36' – – – disch 5 "			59' – – – disch 5 "		
	10 – 36 " "			10 – 33 " "	
	20 – 34			20 – 35	
	30 – 33			30 – 34	
	45 – 32			45 – 32	
1)	37' 00 – 31 " "		1)	10h 00' 00 – 31 " "	
	30 – 28			30 – 30	
2)	38' 00 – 21		2)	01' 00 – 26	
	30 – 17			30 – 23	
3)	39' 00 – 13 " "		3)	02' 00 – 21 " "	
	30 – 10			30 – 17	
4)	40' 00 – 8		4)	03' 00 – 12	
	30 – 7			30 – 10	
5)	41' 00 – 6 "		5)	04' 00 – 9	
				30 – 8	
			6)	05' 00 – 7 " "	

10h 02' 00" 400k 700ohm
39' 00" 40 " 79 "
39' — disch. 6 "
10 37 " " "
20 36
30 35
45 34
1.) 30' 00 32 " " "
30 30
2.) 31' 00 27
30 24
3.) 32' 00 21 " " "
30 18
4.) 33' 00 15
30 13
5. 34' 00 10
30 9
6.) 35' 00 8 " " "
30 7
7.) 36' 00 6

10h 44' 00" 400k 810ohm
49' 00" 40 " 50 "
49' — disch. 5 "
10 37
20 36
30 35
45 34
1.) 50' 00 32 " " "
30 29
2.) 51' 00 27
30 24
3.) 52' 00 22 " " "
30 19
4.) 53' 00 17
30 15
5.) 54' 00 13
30 11
6.) 55' 00 9 " "
30 8
7.) 56' 00 7

11h 11' 00" 600k 820ohm
16' 00" 40 " 58 "
— disch. 5 "
10 35 " " "
20 38
30 37
45 37
1.) 17' 00 36 " " "
30 35
2.) 18' 00 34
30 33
3.) 19' 00 31 " " "
30 29
4.) 20' 00 27
30 25
5.) 21' 00 23
6.) 22' 00 20 " " "
7.) 23' 00 17
8.) 24' 00 14
9.) 25' 00 11 " "
10.) 26' 00 8
11.) 27' 00 7

11h 46' 00" 400k 810ohm
51' 00" 40 " 58 "
51' — disch. 5 "
10 39 " "
20 38
30 38
45 37
1.) 52' 00 36 " " "
30 35
2.) 53' 00 34
30 32
3.) 54' 00 30 " " "
30 28
4.) 55' 00 25
30 23
5.) 56' 00 22
6.) 57' 00 20 " " "
7.) 58' 00 17
8.) 59' 00 15
9.) 60' 00 12 " "
10.) 01' 00 9
11.) 02' 00 7
12.) 03' 00 6

 "5" minute Charges.

1h 57' 00" .. 50 ch	37 ohms	2h 25' 00" .. 20 ch	35 ohms
56' 00" .. 50 "	34 "	30' 00" .. 70 "	32 "
56' ---- disch.	5 "	30' ---- disch	5 "
10 .. 41 "	" "	10" 41 "	" "
20 .. 39		20" 40	
30 .. 38		30" 39	
45 .. 38		45" 38	
1) 57' .. 00 .. 37	" "	1) 31' 00" .. 38	" "
30 .. 36		30 .. 37	
2) 58' .. 00 .. 36		2) 32' 00 .. 35	
30 .. 35		30 .. 34	
3) 59 .. 00 .. 33	" "	3) 33' .. 00" .. 33	
30 .. 31		30 .. 32	
4) 00 .. 00 .. 29		4) 34' 00 .. 31	
30 .. 27		30 .. 29	
5) 01 .. 00 .. 25		5) 35 00 .. 27	
6) 02 .. 00 .. 21	" "	6) 36 .. 00 .. 22	" "
7) 03 .. 00 .. 17		7) 37 .. 00 .. 19	
8) 04 .. 00 .. 12		8) 38 .. 00 .. 17	
9) 05 .. 00 .. 9	"	9) 39 .. 00 .. 13	" "
10) 06 .. 00 .. 7		10) 40 .. 00 .. 11	
11) 07 .. 00 .. 6		11) 41 .. 00 .. 8	
		12) 42 .. 00 .. 6	" "

Wednesday, 7th July.

Determination of retaining capacity of a cell —
Cell used, being previous one.

"Five" minute Charges

Time	Defl.	Extra Resist.	Time	Defl.	Extra Resist.
9h 41' 00" .. 60 ch		53 ohms	10h 22' 00" .. 60 ch		50 ohms
46' 00" .. 60 "		45 "	27' 00" .. 60 "		45 "
46' 00" .. disconnected			27' 00" .. disconnected		
51' ---- disch.		0 ohms	32' ---- disch.		0 ohms
10 .. 75 "	" "		10 .. 80 "	" "	
20 .. 68			20 .. 74		
30 .. 62			30 .. 65		
45 .. 53			45 .. 61		
1.) 52' .. 00 .. 45 "	" "		1) 33 .. 00 .. 50	" "	
30 .. 28			30 .. 43		
2.) 53' .. 00 .. 19			2) 34 .. 00 .. 32		
30 .. 15			30 .. 26		
3.) 54 .. 00 .. 12	" "		3) 35 .. 00 .. 22	" "	
30 .. 9			30 .. 17		
4.) 55' .. 00 .. 8			4) 36 .. 00 .. 13		
30 .. 7			30 .. 10		
5.) 56' .. 00 .. 6			5.) 37 .. 00 .. 9		
30 .. 6			30 .. 8		
6.) 57' 00 .. 5	" "		6.) 38' .. 00 .. 7	" "	

10h 53' 00" – 1000 ch 51 ohms
58' 00" – 100 " 49 "
58' 00" – disconnected
11h 03' – 5-90 disch 0 ohms
10 – 82 " " "
20 – 77
30 – 73
45 – 65
1.) 04' – 00 – 59 " " "
30 – 46
2.) 05' – 00 – 37
30 – 31
3.) 06' – 00 – 28
30 – 23
4.) 07' – 00 – 19
30 – 15
5.) 08' – 00 – 12
30 – 11
6.) 09' – 00 – 10 " " "
30 – 9
7.) 10' – 00 – 8
30 – 7
8.) 11' – 00 – 5 " " "

11h 30' 00" – 1000 ch 51 ohms
35' 00" – 100 " 49 "
35' 00" – disconnected
40' – 5-90 disch 0 ohms
10" – 85 " " "
20 – 78
30 – 73
40 – 66
1.) 41' – 00 – 60 " " "
30 – 46
2.) 42' 00 – 38
30 – 32
3.) 43' – 00 – 27 " " "
30 – 23
4.) 44' – 00 – 20
30 – 17
5.) 45' – 00 – 14
30 – 11
6.) 46' – 00 – 9 " " "
30 – 9
7.) 47' – 00 – 8
30 – 7
8.) 48' – 00 – 7

12h 06' 00" – 1000 ch 51 ohms
11' 00" – 100 " 45 "
11' 00" – disconnected
16' – 5-90 disch 0 "
10 – 85 " " "
20 – 77
30 – 72
45 – 65
1.) 17' – 00 – 55 " " "
30 – 45
2.) 18' – 00 – 36
30 – 31
3.) 19' – 00 – 26
30 – 22
4.) 20' – 00 – 20
30 – 16
5.) 21' – 00 – 13
30 – 10
6.) 22' – 00 – 8 " " "
30 – 7
7.) 23' – 00 – 7
30 – 6
8.) 24' – 00 – 6
30 – 6
9.) 25' – 00 – 5

Maximum charge is probably reached.

Five minute charges

10 minutes between disconnection & discharging

1h 29' 00"	60 ch	500 ohms	2h 07' 00"	60 ch	500 ohms
34' 00"	60 "	49 "	12' 00"	60 "	49 "
34' 00"	disconnected		12' 00"	discon	
44' 5	78 disch	0 ohms	22 5	82 disch	0 "
10	77 "	" "	10	78 "	"
20	74		20	71	
30	68		30	65	
45	59		45	57	
1) 45' 00	51 "	" "	1) 03 00	50 "	" "
30	42		30	41	
2) 46 00	33		2) 04 00	34	
30	29		30	29	
3) 47 00	25 "	" "	3) 05 00	25 "	" "
30	21		30	22	
4) 48 00	17		4) 06 00	19	
30	14		30	16	
5) 49 00	11		5) 07 00	14	
30	9		30	11	
6) 50 00	8 "	" "	6) 08 00	9 "	" "
30	7		30	8	
7) 51 00	7		7) 09 00	7	
8) 52 00	6		8) 30 00	7	
9) 53 00	5 "	" "	9) 31 00	6 "	" "
			10) 32' 00	5	

Five Minute Charges

2h 47' 00"	60 ch	500 ohms
52 00"	60 "	49 "
52 00"	disconnected	
3h 02' 5	79 disch	0 ohms
10	78 "	" "
20	72	
30	67	
45	58	
1) 03 00	52 "	" "
30	41	
2) 04 00	34	
30	29	
3) 05 00	26 "	" "
30	23	
4) 06 00	20	
30	17	
5) 07 00	14	
30	11	
6) 08 00	9 "	"
30	7	
7) 09 00	6	
8) 10 00	6 5	
9) 11 00	5 "	" "
10) 12 00	4	

Maximum charge probably reached

"Five Minute" charges.

15 minutes disconnection

3h 27' 00" .. 60 ch 5·10 ohms		4h 10' 00" .. 60 ch	5·0 ohms
32' 00" .. 60 " 4·9 "		15' 00" .. 60 " 4·9 "	
32' 00" disconnection		15' 00" disconnection	
47' ... 5·71 disch 0 ohms		30 ... 5·79 disch 0 ohms	
10 – 73 " " "		10 – 71 " " "	
20 – 65		20 – 62	
30 – 59		30 – 56	
45 – 52		45 – 49	
1.) 48 – 60 – 45 " " "		1.) 31 – 60 – 45 " " "	
30 – 37		30 – 36	
2.) 49 – 60 – 30		2.) 32 – 60 – 30	
30 – 26		30 – 26	
3.) 50 – 60 – 23 " " "		3.) 33 – 60 – 23 " "	
30 – 21		30 – 20	
4.) 51 – 60 – 18		4.) 34 – 60 – 18	
30 – 15		30 – 15	
5.) 52 – 60 – 13		5.) 35 – 60 – 13	
30 – 11		30 – 11	
6.) 53 – 60 – 9 " " "		6.) 36 – 60 – 10 " " "	
30 – 7		30 – 9	
7.) 54 – 60 – 6		7.) 37 – 60 – 7	
30 – 6		30 – 6	
8.) 55 – 60 – 5 " " "		8.) 38 – 60 – 5 " " "	

"Five Minute" Charge

20 minutes disconnected [illegible]

4h 53' 00" .. 60 ch 5·0 ohms	
58' 00" .. 60 .. 4·9 "	
58' 00" disconnection	
18 ... 5·80 disch 0 ohms	
10 – 70 " " "	
20 – 62	
30 – 54	
45 – 46	
1.) 19 – 60 – 43 " " "	
30 – 36	
2.) 20 – 60 – 30	
30 – 27	
3.) 21 – 60 – 24 " " "	
30 – 21	
4.) 22 – 60 – 19	
30 – 17	
5.) 23 – 60 – 14	
30 – 12	
6.) 24 – 60 – 10 " " "	
30 – 8	
7.) 25 – 60 – 7	
30 – 6	
8.) 26 – 60 – 5	

Thursday, 9th July 1885

30 minutes disconnected, before discharge

9h 27' 00" .. back 51 ohms
47' 00" .. " 49 "
47 -- 5-130 back 0 "
10-120 "
57 -- 00 - 64 "
57' -- 00 - 70 "
10h 13' -- 00 - 4 "

10h 25' 00" .. back 51 ohms
30' 00" .. back " 49 "
30' 00" disconnected
11h 00' .. 5-70 disch 0 ohms
10-62
20-57
30-52
45-45
1.) 01 -- 00 - 42
30 - 34
2.) 02 -- 00 - 30
30 - 25
3.) 03 -- 00 - 22
30 - 20
4.) 04 -- 00 - 18
30 - 16
5.) 05 -- 00 - 14
30 - 12
6.) 06 - 00 - 10
30 - 8
7.) 07 - 00 - 6
30 - 5
8.) 08 00 - 5

30 minutes disconnected before discharge

11h 31' 00" .. back 50 ohms
36' 00" .. 60 " 49 "
36' 00" .. disconnected
56' -- 5-70 disch 0 ohms
10-61 " " "
20-52
30-46
45-41
1.) 57' -- 00-38
30-33
2.) 58' -- 00-29
30-25
3.) 59' -- 00-21
30-19
4.) 00 -- 00-17
30-16
5.) 01' -- 00-14
30-12
6.) 02' -- 00-11
30-9
7.) 03' -- 00-8
30-7
8.) 04 -- 00-6
30-6
9.) 05 -- 00 - 5

Five minute Charge

1 hour disconnected before discharge

1h 35' 00"	60 charge	50 ohms	3h 15' 00"	60 ch	50 ohms
40' 00"	60 "	49 "	20' 00"	60 "	"
40' 00"	disconnected		20' 00"	disconnected	
2h 40' 5"	54 disch	0 ohms	4h 20' 5"	53 disch	0 ohms
10"	45 "	" "	10"	47 "	" "
20"	38		20"	37	
30"	34		30"	32	
45"	30		45"	29	
1) 41' 00"	27 "	" "	1) 21' 00"	26 "	" "
30"	23		30"	22	
2) 42' 00"	20		2) 22' 00"	19	
30"	17		30"	17	
3) 43' 00"	15 "	" "	3) 23' 00"	15 "	" "
30"	13		30"	13	
4) 44' 00"	11		4) 24' 00"	11	
30"	10		30"	10	
5) 45' 00"	9		5) 25' 00"	8	
30"	8		30"	7	
6) 46' 00"	7 "	" "	6) 26' 00"	6 "	" "
30"	6		30"	6	
7) 47' 00"	5		7) 27' 00"	5	
30"	4		30"	5	
8) 48' 00"	4		8) 28' 00"	4	

Friday 10th July 1885 —

Effect of reversal of charging current

10 5 minute charges direct

9h 14' 00"	60 ch	50 ohms	9h 41' 00"	60 ch	50 ohms
19' 00"	60 "	49 "	46' 00"	60 "	"
19'	disch 0 "		46'	disch 0 "	
10"	97 "	" "	10"	97 "	" "
20"	95		20"	90	
30"	85		30"	83	
40"	76		45"	74	
1) 20' 00"	66 "	" "	1) 47' 00"	67 "	" "
30"	46		30"	52	
2) 21' 00"	27		2) 48' 00"	45	
30"	19		30"	21	
3) 22' 00"	15 "	" "	3) 49' 00"	[illegible] "	" "
30"	12		30"	16	
4) 23' 00"	10		4) 50' 00"	13	
30"	8		30"	11	
5) 24' 00"	7		5) 51' 00"	9	
30"	6		30"	8	
6) 25' 00"	6 "	" "	6) 52' 00"	7 "	" "
30"	5		30"	7	
7) 26' 00"	5		7) 53' 00"	6	

"Five Minutes" charges.
Direct charges

10h 15' 20" – 60 ch 50 ohms
20' 20" – 60 " 49 "
26 ... special 0 "
10 – 102 " " "
20 – 96
30 – 90
45 – 78
1.) 21 – 00 – 72 " " "
15 – 63
30 – 54
2.) 22 – 00 – 40
30 – 29
3.) 23' – 00 – 21 " " "
30 – 17
4.) 24' – 00 – 13
30 – 11
5.) 25' – 00 – 9
20 – 8
6.) 26 – 00 – 7
30 – 7
7.) 27 – 00 – 6
30 – 6
8.) 30' – 00 – 5
30 – 5
9.) 29 – 00 – 4 " " "

10h 44' 20" – 60 ch 49 ohms
49' 20" – 60 " 48 "
49 .. 5 110 diesel 0 "
10 – 102
20 – 96
30 – 91
45 – 81
1.) 50' – 00 – 74 " " "
15 – 64
30 – 55
2.) 51 – 00 – 43
30 – 33
3.) 52 – 00 – 24 " " "
30 – 19
4.) 53' – 00 – 15
30 – 12
5.) 54 – 00 – 10
30 – 8
6.) 55' – 00 – 7 " " "
30 – 7
7.) 56 – 00 – 6
30 – 6
8.) 57 – 00 – 5
30 – 5
9.) 58 – 00 – 5

"Five Minutes" Charges C&C
Reversed-Current Charges.

11h 10' 20" – 60 ch 58 ohms
15' 20" – 60 " 50 "
15 .. 5 50 diesel 0 "
10 – 38 " " "
20 – 19
30 – 9
45 – 5
1.) 16' – 00 – 4 " " "
15 – 3
30 – 3
2.) 17 – 00 – 2
30 – 2
3.) 18' – 00 – 1 " " "
30 – 1
4.) 19' – 00 – 1

11h 25' 20" – 60 ch 51 ohms
30' 20" – 60 " 49 "
30 ... 86 diesel 0 "
10 – 79 " " "
20 – 69
30 – 60
45 – 50
1.) 31' – 00 – 40 " " "
15 – 28
30 – 20
2.) 32' – 00 – 15
30 – 10
3.) 33' – 00 – 6 " " "
30 – 5
4.) 34' – 00 – 5

11h 49' 00" – 60 ch 51 ohms
54' 00" – 60 " 49 "
54 ---- disch 0 "
10 – 90 " " "
30 – 79
30 – 69
45 – 61
1.) 55' 00 – 57 " " "
15 – 43
30 – 34
2.) 56' 00 – 21
30 – 15
3.) 57' 00 – 11 " " "
30 – 7
4.) 58' 00 – 6
30 – 5
5.) 59' 00 – 4

17h 10' 00" – 60 ch 51 ohms
15' 00" – 60 " 49 "
15 --- disch 0 "
10 – 95 "
30 – 85
30 – 76
45 – 67
1.) 16' 00 – 60 " "
15 – 52
30 – 42
2.) 17' 00 – 30
30 – 21
3.) 18' 00 – 14 " "
30 – 11
4.) 19' 00 – 8
30 – 7
5.) 20' 00 – 7
30 – 6
6.) 21' 00 – 6

1h 25' 00" – 60 ch 50 oh
30' 00" – 60 " 48 "
30' ---- disch 0 "
10 – 96 " " "
30 – 87
30 – 78
45 – 68
1.) 31' 00 – 58 " " "
15 – 51
30 – 42
2.) 32' 00 – 30
30 – 20
3.) 33' 00 – 14 " " "
30 – 11
4.) 34' 00 – 7
30 – 7
5.) 35' 00 – 6
30 – 5
6.) 36' 00 – 5 " " "

3h 08' 00" – 60 ch 50 ohms
13' 00" – 60 " 49 "
13 ---- disch 0 "
10 – 94 " "
30 – 86
30 – 80
45 – 71
1.) 14' 00 – 62 " " "
15 – 53
30 – 44
2.) 15' 00 – 33
30 – 22
3.) 16' 00 – 16
30 – 12
4.) 17' 00 – 10
30 – [illegible]
5.) 18' 00 – 7
30 – 6
6.) 19' 00 – 5 " " "

Resistance of Cell by Decreased Resist. of Circuit

Time	Reading	Extra Resist.	Probable Reading	Current	Resist. Int.	E.M.F.
4h 11' 00"	60 ch	50 ohms	Constant of Galvan.			= .0018
21' 00"	60	49	Resist.			= .3 ohms
21' 00"	discharge					
				Ampères	Ohms	Volts
10"	110	0				
20"	39	5	105	.190	2.9	.551
30"	100	0				
40"	96	0				
50"	75	0				
1) 22' 00"	35	5	84	.151	3.6	.544
15"	80	0				
30"	78	0				
45"	33	5	75	.135	3.9	.527
2) 23' 00"	71	0				
10	68	0				
15	31	5	66	.117	4.4	.515
30	60	0				
55	53	0				
3) 24' 00	25	5	51	.092	4.9	.451
25	41	0				
30	23	5	45	.081	5.2	.421
4) 25' 00	39	0				
25	37	0				
20	19	5	34	.061	6.3	.384
5) 26' 00	18	0				
05	18	5	28	.047	9.0	.443

Saturday 11th July 1885.

Continuation of Preceding –

Time	Reading	Extra Resist.	Probable Reading	Current	Resist. of cell + Galvan. + connections	E.M.F.
9h 32' 00"	60 ch	57 ohms				
32' 00"	60	47				
32'	discharge					
				Ampères	Ohms	Volts
10"	108	0				
12"	42	5	107	.193	3.2	.618
15"	101	0				
20	96	0				
30	92	0				
1) 33' 00	90	0				
15	86	0				
18	36	5	85	.153	3.7	.567
30	83	0				
35	35	5	82	.14	3.8	.532
2) 34' 00	75	0				
25	65	0				
30	32	5	65	.12	4.8	.576
45	62	0				
50	29	5	60	.11	4.7	.517
3) 35' 00	58	0				
4) 36' 00	42	0				
05	22	5	41	.107	5.8	.406
40	36	0				
45	20	5	35	.065	7.3	.365
5) 37' 15	32	0				
20	15	5	22	.038	10.7	.406

 Solution given on p. 182.

10h 01' a.m. — 60 ch. 5 ohms

11 a.m. — discharge

				Amperes	$R=\frac{r d_2}{d_1-d_2}$ Ohms	Volts
8"	105	0 "				
10"	40	5 "	108	.194	3.9	.573
18"	105	0 "				
20"	35	5 "	104	.187	3.0	.561
30	100	0 "				
35	37	5 "	99	.178	3.0	.534
55	92	0 "				
1) 12' 20	36	5 "	91	.164	3.2	.525
20	86	0 "				
30	35	5 "	85	.153	3.5	.535
2) 13' 20	70	0 "				
04	32	5 "	69	.126	4.2	.529
30	65	0 "				
35	30	5 "	63	.115	4.5	.510
3) 14' 05	56	0 "				
07	26	5 "	55	.099	4.5	.446
28	149	0 "				
30	24	5 "	48	.086	5.0	.430
4) 15' 13	41	0 "				
15	21	5 "	40	.072	5.5	.396
57	23	0 "				
5) 16' 20	18	5 "	32	.058	6.4	.381
43	20	0 "				
	17	5 "	28	.049	7.8	.371

Carbon Plates — see p. 182.

				C	R	E
6) 17' 28	23	0 "				
30	15	5 "	23	.040	9.4	.376
55	21	0 "				
7) 18' 20	13	5 "	20	.036	10.4	.374
30	17	0 "				
35	12	5 "	17	.031	12.0	.372
55	14	0 "				
8) 19' 20	9	5 "	13	.023	11.2	.258
28	12	0 "				
30	8	5 "	12	.022	10.0	.220
55	11	"				
9) 20' 00"	10	0 "				
03	6	5 "	10	.018	7.5	.135
15	9	0 "				

Monday, 13th July

"30 minute" charge   "60 minute" charge

1^h 36' 00" 60 ch 500 ohms   10 division still charged
3^h 06' 00" 60 " 46 " 2^h 30' 00" 60 ch 450 ohms
06 -- 10 -- 112 disch " " 3^h 30' 00" 60 " 37 "
20 -- 108 " " "   30' -- disch " "
30 -- 110   10 -- 115 " "
50 -- 104   20 -- 112
1.) 07' -- 00 -- 102 " "   30 -- 112
30 -- 100
3.) 09 -- 00 -- 92   1.) 31' -- 00 -- 112
5.) 11 -- 00 -- 78   2.) 32 -- 00 -- 107
8.) 14 -- 00 -- 57   4.) 34 -- 00 -- 96
10.) 16' 00" 47 " "   5.) 35 -- 00 -- 89 " "
12.) 19' 00" 37   7.) 37 -- 00 -- 80
17.) 23 -- 00 -- 23   9.) 39 -- 00 -- 73
19.) 25' 00" 17 " "   11.) 41 -- 00 -- 70
20.) 26 -- 00 -- 16   15.) 45 -- 00 -- 60
16.) 46 -- 00 -- 53 " "
22.) 52 -- 00 -- 42
26.) 56 -- 00 -- 34
30.) -- 00 -- 00 -- 27 " "

One hour charge

4^h 10' 00" 60 ch 450 ohms
5^h 10' 00" 60 " 35 "   9.) 19 -- 00 -- 72 disch 0 ohms
10 -- -- disch " "   30 -- 70 " " "
10 -- 118 " "   10.) 20 -- 00 -- 69
20 -- 115   30 -- 68
30 -- 115   11.) 21 -- 00 -- 67
45 -- 115   12.) 22 -- 00 -- 65 " "
1.) 11 -- 00 -- 114 " "   13.) 23 -- 00 -- 62
15 -- 112   14.) 24 -- 00 -- 60
30 -- 110   15.) 25 -- 00 -- 58 " "
45 -- 108   16.) 26 -- 00 -- 55
2.) 12 -- 00 -- 106   17.) 27 -- 00 -- 52
15 -- 104   18.) 28 -- 00 -- 50 " "
30 -- 102   20.) 30 -- 00 -- 46
3.) 13' -- 00 -- 100 " "   22.) 32 -- 00 -- 42
30 -- 97   24.) 34 -- 00 -- 37 " "
4.) 14' -- 00 -- 94   26.) 36 -- 00 -- 33
30 -- 90   27.) 37 -- 00 -- 30
5.) 15' -- 00 -- 87   30.) 40 -- 00 -- 27 " "
30 -- 85   34.) 44 -- 00 -- 20
6.) 16 -- 00 -- 83 " "   39.) 49 -- 00 -- 13
30 -- 81   42.) 53 -- 00 -- 11
7.) 17' -- 00 -- 79   45.) 55 -- 00 -- 9 " "
30 -- 77
8.) 18' -- 00 -- 75
30 -- 73

Resist and E.M.F. Sunday, 14th Feb.

	Time	60 cL	440 ohms		Current	Resist	E.M.F.
	2h 12' 00"	60 cL	440 ohms				
	42' 00"	60 "	39 "				
	42 ... 6"	60 cL.	0 "				
	8"	112	0		amperes	ohms	volts
	10"	37.5	5	109	.197	2.9	.570
	13"	107	0				
	15"	37.3	5	107	.194	2.9	.563
	18"	106	0				
	20"	105	0				
	28"	36.7	5	104	.187	3.0	.561
	30"	103	0				
	45"	103	0				
	48"	36.3	5	102	.184	3.0	.552
1.)	43' 15"	101	0				
	17	35	5	101	.182	3.0	.546
	30	100	0				
	33	37	5	100	.180	3.0	.540
2.)	44' 00	95	0				
	03	36	5	95	.171	3.1	.530
	28	92	0				
3.)	45' 30	35	5	91	.164	3.2	.525
4.)	46' 30	86	0				
	32	34	5	84	.151	3.4	.513
5.)	47' 00	73	0				
6.)	48' 03	33	5	74	.133	4.0	.532

	Time						
	2h 49' 00"	68	0 ohms				
	03	32	5	68	.122	4.4	.537
9.)	51' 00"	60	0				
	03"	[illegible]	5	60	.108	4.4	.475
10.)	52' 00"	56	0				
	03"	27	5	56	.101	4.6	.465
11.)	53' 00"	50	0				
	03"	25	5	50	.090	5.0	.450
12.)	54' 27"	43	0				
	30"	22	5	43	.077	5.2	.390
14.)	56' 00"	37	0				
	03"	21	5	37	.067	6.5	.435
	50"	33	0				
15.)	57' 20	20	5	33	.059	7.7	.454
	57	27	0				
16.)	58' 00	17	5	27	.049	8.5	.416
	51	23	0				
18.)	00' 00	15	5	23	.041	9.4	.385
	50	20	0				
20.)	02' 00	14.5	5	20	.036	13.0	.468
	57	18	0				
21.)	03' 00	13.5	5	18	.032	15.0	.480
	57	16.5	0				
23.)	04' 00	15	5	16.5	.030	11.5	.345
24.)	06' 15	13					
	16	8	5	12.5	.023	9.0	.207
26.)	08' 00	11					
	03	7	—	10	.018	8.7	.157

#69-D Wednesday, 15th July.

1) Water – distilled 50 grms = 25 %
2) Hydro-chloric acid cp. 14 " = 7 %
3) Selenic acid cp. 2 " = 1 %
4) Manganese chloride cp. 18 " = 9 %
5) Zinc chloride cp. 32 " = 16 %
6) Antimony perchloride 84 " = 42 %
Total 200 grms = 100 %

Specific gravity = 1.75

First two components to be mixed and third dissolved in them by heating. The last three to be added in their order, dissolving by heating as before.

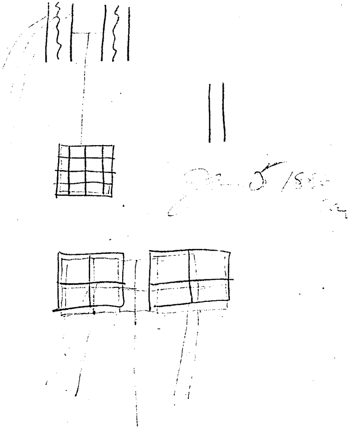
#69-D – New Cartons – 2½ × ¾ × ¼ approx.

Time	Defl.	Extra resist.	Time	Defl.	Ext. resist.
2h 42' 00"	60 defl.	4 ohms	3h 05' 00"	60 defl.	[illegible]
52' 00"	60 "	43 "	15' 00"	60 "	[illegible]
52'	[illegible]	0 "	15'	[illegible]	0 "
15	"	"	15	"	"
30	150		15	150	
30	120		30	[illegible]	
45	75		45	103	
1) 53 .. 00	62	" "	1) 16 .. 00	72	" "
15	55		15	[illegible]	
30	48		[illegible]	63	
2) 54 .. 00	41		2) 17 .. 00	52	
30	35		[illegible]	40	
3.) 55 00	30	" "	3) [illegible]	34	" "
30	26		30	[illegible]	
4) 56 .. 00	23		4) 19 .. 00	27	
30	21		30	25	
5) 57 00	19		5) 20 .. 00	23	
30	17		[illegible]	21	
6.) 58 .. 00	16	" "	6.) 21 .. 00	20	" "
7.) 59 .. 00	14		7) 22 .. 00	18	
8.) 00 .. 00	11		8.) [illegible]	16	
9.) 01 .. 00	9		9) [illegible]	[illegible]	
10.) 02 .. 00	5	" "	11) [illegible]	[illegible]	
			12) 27 .. 00	12	" "

 3rd Charge – Determination of Resist. & E.m.f.

Time	Defl.	Extra Resist	Probable Defl.	Current	Resist	E.m.f.
3h 40' 00"	60	45 ohms				
50' 00"	80	42				
56	[illegible]	0				
8	90°	0		Ampère Ohms Volts.		
17	51	5	90°			
19	90°	0				
20	44	5	90°			
[illegible]	150	0				
	40	5	150	·270	1·82	·491
43	120	0				
45	38	5	120	·216	2·04	·441
58	90	0				
3) 57	00 [illegible]	5	[illegible]	·162	2·5[illegible]	·405
9	69	0				
30	[illegible]	5	69	·124	3·02	·375
59	53	0				
4) 58	00 22	5	53	·095	3·55	·342
29	44	0				
30	19	5	44	·079	3·80	·300
58	39	0				
5) 53	00 15	5	39	·0702	3·12	·219
20	32	0				
30	[illegible]	5	33	·0594	3·25	·193

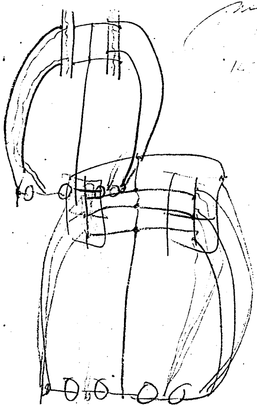
Time	Defl.	Extra Resist	Probable Defl.	Current	Resist	E.m.f.
3h 54' 00"	28	0 ohms		Ampère	Ohms	Volts
	01 12	5	25	·0504	3·7[illegible]	·191
	27 25	0				
	30 10	5	25	·0450	3·33	·150
	58 23	0				
5) 55'	00 9·5	5		·044	3·52	·155
	28 22					
	30 9	5		·0316	[illegible]	·139
	58 20	0				
6) 56'	00 6·5	5		·0360	3·70	·133
	27 19	0				
	30 8			·0342	3·6[illegible]	·123
	58 17					
7) 57'	00 76			·032[illegible]	3·65	·120
	28 17					
	30 74			·0316	3·75	·115
	58 16					
8) 58'	00 7			·0296	3·88	·112
	58 16					
9) 59'	00 64			·0259	4·21	·109
	58 13					
10) 60'	00 62		13	·0234	4·56	·104
	58 12·5					
11) 01'	00 58		12·5	·0335	4·33	·097
	58 10					
14) 04'	00 5	5		·018	5·00	·090



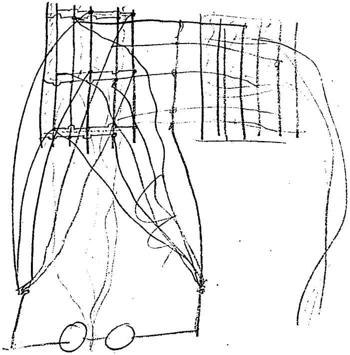
Jany 6 [illegible]

[illegible]

40,
20

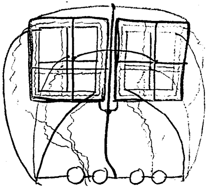


Jany 5 1886
Tex



Jany 6 1886

Tag



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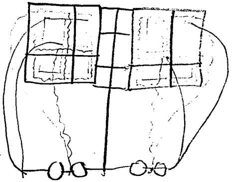
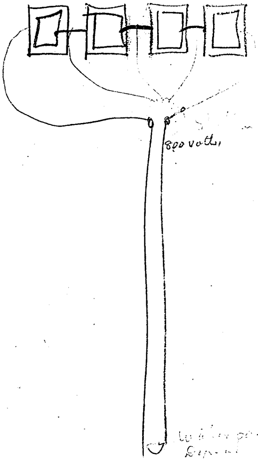


No 2

Jany 6 188[illegible]

[illegible]



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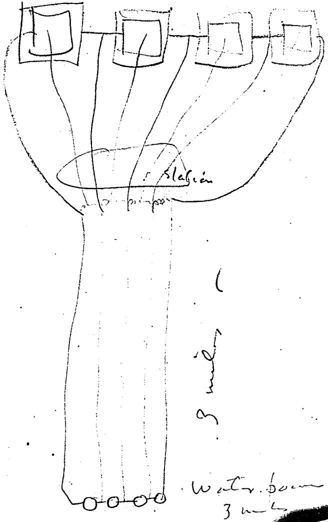
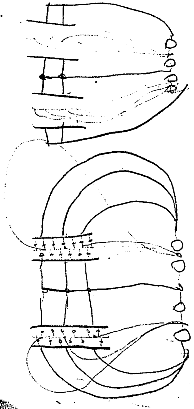
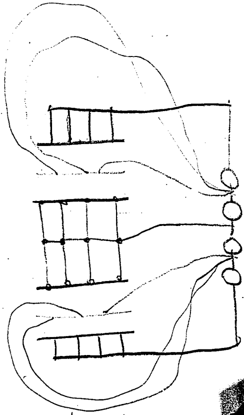
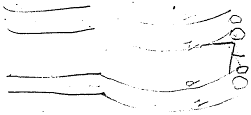
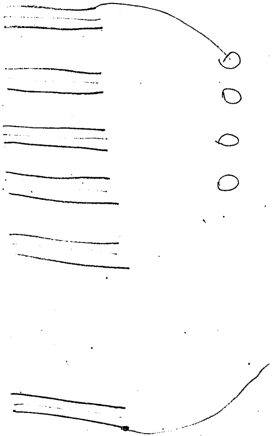
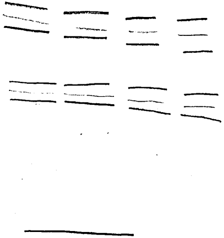


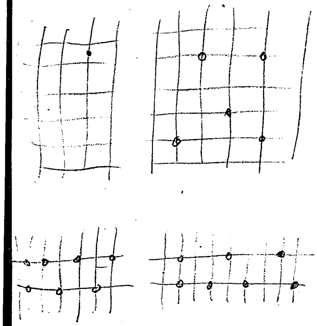


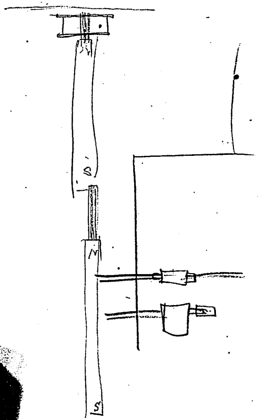




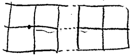








8000
15000
3000
8000
1000
35000



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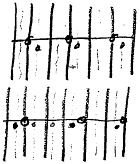

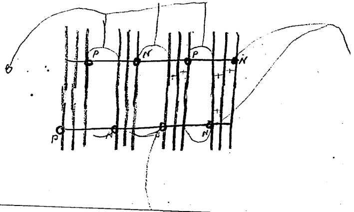
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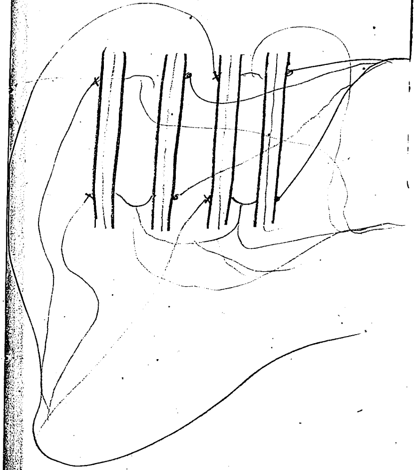
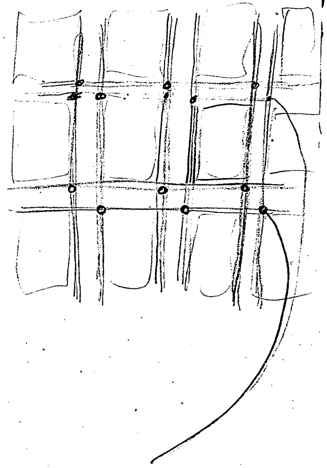
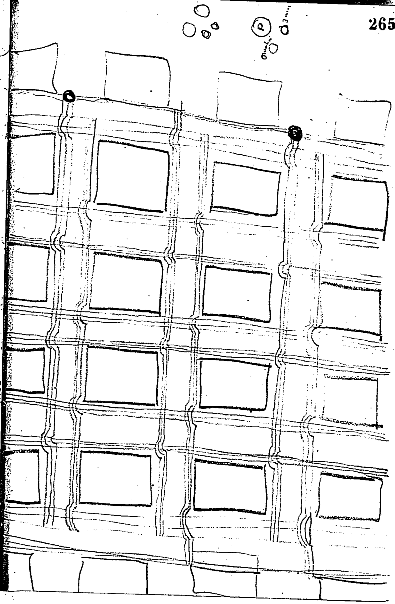






New York Notebook, N-85-10-01

This notebook covers the period October 1885-November 1886. Most of the entries are by Edison. Included are notes and drawings relating to the telephone and phonoplex, electric power distribution, lamp experiments, a thermostatic regulator for heating houses, a kerosene lamp for railroads, and a snow clearing machine. There are also measurements, calculations, and tables labeled "horizontal force"; notes on thermoelectricity; building plans for a new laboratory; and a list of items wanted by the Railway Telegraph and Telephone Company. A few entries on the telephone and phonoplex are by John F. Ott, one entry on the telephone is by Ezra T. Gilliland, and one entry on the phonoplex appears to be by Alfred O. Tate. Many of the entries were witnessed by Ott and Martin Force. The inside front cover was signed by Samuel Edison. The book contains 280 numbered pages.

Blank pages not filmed: 70-75, 90-91, 122-123, 152-153, 168-173, 176-181, 204-209, 234-235, 244, 247, 268, 271.

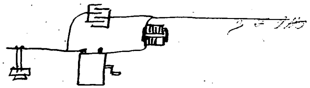
Missing page numbers: 133-136, 213-222, 227-232, 245-246, 251-264, 269-270, 277-278.

N-85-10-01

Samuel Edison

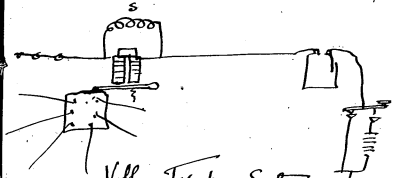
N-85-10-01

Oct 1 1885
TAE



Device applied to Telephone ringer so it will dull waves and prevent them being heard in Telephone, wks ok tried by Gilliland

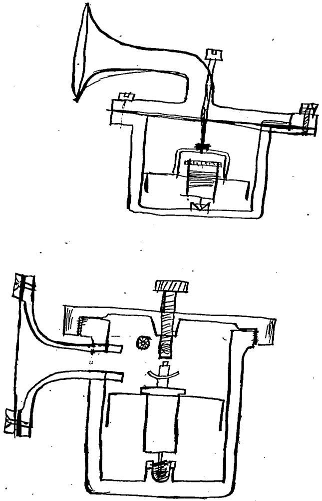
TAE
EJG

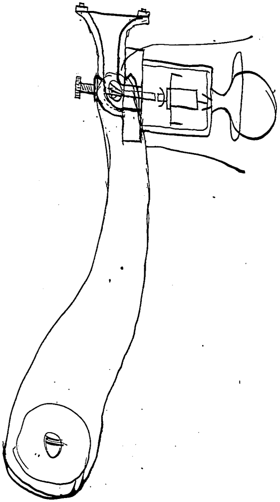


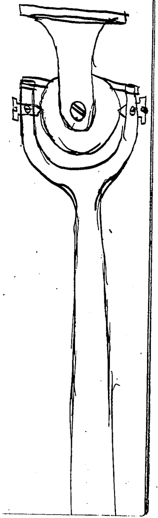
Village Telephone System

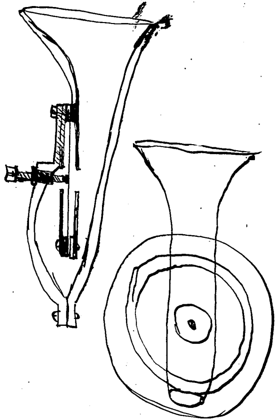
Shunt around releasing magnet on Commutator Switch intended to retard & prevent magneto call waves from acting on it
ok tried by Gilliland

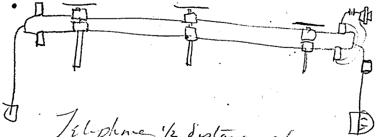
TAE EJG











Telephone 1/2 distance of metallic ckts with no induction makes 4 times louder — Receiving phones differential as to induction Currents but ok as to talking Currents from Induction Coils opposite direction

Nov 11 1885 9.5 AM

EPG

TAE

Railroad Telegh & Tel Co

Wants standard forms of

Couplings for Car roofs

Battery boxes - anti freezing.

Receiving Instrument for Cap or Head gear -

Receiving Instrument for left hand -

Combination Switch, Independent -

Thompson Lowes Dec 10th
Indpls at 1.20 pm 12th
leave Sunday night or

Ship at Portland Me Dec 10 11th
probably leave tomorrow –

Double Contact Rods

Coils made on standard
base boards with spring
Connections –

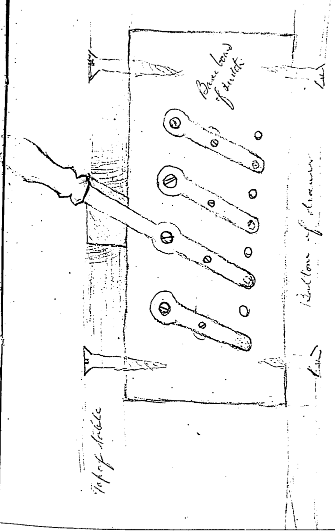
Mem –
Contacts to the ground
Connection brushes should be
made of some flexible cord
with a covering that will stand
the dirt and grass – The
Rubber wire used at present
dries up and cracks –
The table should have
screws in the feet the

screws should be pointed to serve the double purpose for dwelling and preventing table sliding around -

Contact plugs for connecting roofs of cars together should be made so that they will pull out, in case cars are uncoupled without unhooking or disconnecting the cords —

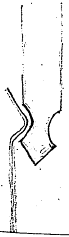
The combination switch should be placed on the left hand side of table and should be arranged so that one movement moves all the switches -

RR Continued



Combination Switch

About 1/4 size



J. F. Ott
M N Force

Coils

Switch to throw
2 3 4 5 + 6,
cells quickly.

Primary -:

✓ 1. 7 ohm coil.

2 cells 3 cells 4 5 + 6 cells -

✓ 1 3 ohm coil

2 3.4 5 + 6 cells

✓ 1 .2 ohm Coil

Same cells.

✓ 1 .1 ohm coil

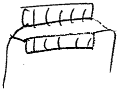
✓ 1 .40 coil wound so as to be same size as the 7 ohm Coil in diameter + length

✓ 1 14 ohm Coil

Dec 12, 85 Reg 7 ohm length.

J. F. Ott ✓

Mill Ex 2. 3 ohm Coils
multiple arcs



✓ 2 7 ohm multiple arc
✓ 2 14 " "

all tried with the 2 745-96
Cell —

✓ 2 - 2 ohm in series
✓ 2 3 " "
✓ 2 7 " "
✓ 2 14 " "

Dec 12. 85

~~[illegible]~~ [illegible]

Condenser across
the vibrator to be
varied ~~[illegible]~~ first
8 then 16 32. 48.

72. 100.

Each experiment

J. F. Ott

~~after testing these~~ M.O.F

Secondary -

Regular telephone Coil
varying battery & varying condenser
then, The three large Coils,
then. The several varieties
of small coils with
low resistance secondary
& also high resistance
primary -

Try all these Coils, etc
at this station on Table
having two or 3 sets
set up - and while Experiments

are being tried on one
Set another is being
got ready Thus with
3 Sets or Even two
the Expmts can be made
Continuous =

During the Experiments
The Condenser devices
etc for getting rid of
induction & also for
Connecting to the line
must remain Undisturbed

Dec. 12. 85
J. F. Ott
M N F

Dec 12 85

~~Have~~ J. F. Ott

a ~~thorough~~ mnt understanding must be had with the train man so he records the Experimenting. another man should be with him & have a telephone & he should record his impressions independent of the other man —

The nature of every change made at the sending station should be telegphd to train so the two person each of whom have a telephone to Ea

Dec. 12, 85 J F Ott

Can record ~~them~~ MNF & giving
them time to record
their impressions as to
loudness Etc =

One man should watch
the reed at the sending
~~station~~ ~~at~~ keeping
it at same ~~tone~~
which he can do by
adjusting & moving
~~[illegible]~~ of a tuning
fork —

After the best form of

Dec 12 85 J. F. Ott

Coil ~~&~~ Condenser & battery
is obtained - another
trip should be taken
using these forms solely
and variations in the
reed & Condensers etc
gone through - to
ascertain what
improvement can be
made in this device -

Each Experiment of Coils
etc should be numbered
& these numbers
telegraphed so all those
persons involved

record the same

Experiment —

After all these Experiments
& the best form of Coils
batteries Condensers
note in reed - Commutator
to bein - etc you
might make ½ doz
receiving telephones of
different resistance
& test them

Dec 12 85

J. F. Ott
MNF

R.R. Eff. continued Jan 7th 86.

J.F.O.

H. de C. Hamilton

List of Induction Coils to be tried.

"Regular sized coil" is 3¾ in. long by 1⅜ in. in diameter, with ½ in core diameter.

(#1.) Single, regular sized 1. ohm primary coil. diam wire .041 —

(#2.) Single, regular sized 2. ohm primary. diam. wire .035 —

(#3.) Regular sized 3 ohm primary. diam. wire .031 —

(#4.) Regular sized $\frac{4}{100}$ ohm primary. diam wire .050 —

J. F. Ott

Jan. 7" 86.

(#5.) Regular Sized 7. ohm primary diam wire .023

(#6.) Regular sized 14 ohm primary diam wire .020

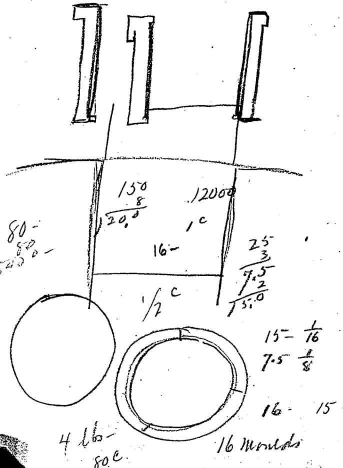
(#7.) Two regular sized 3. ohm primary Coils multiple arced. diam wire .031

(#8.) Two regular sized 7 ohm pri. Coils multiple arced. diam wire .023

(#9.) Two regular sized 14. ohm pri. Coils multiple arced. diam wire .020

(#10.) Two regular sized 2. ohm pri. Coils in Series. diam wire .035

(#11.) Two regular sized 3. ohm. Pri Coils in Series. diam wire .031



J. F. O. Jan 7."86.

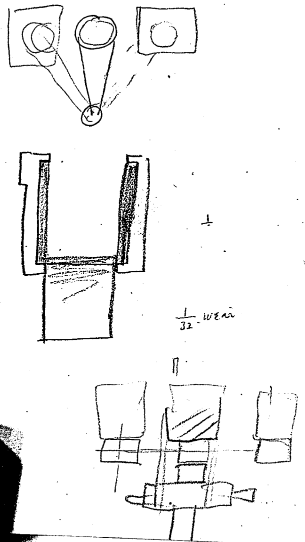
(#12.) Two regular sized 7. ohm Pri
Coils in Series. diam wire .024
(#13.) Two regular sized 14. ohm Pri
Coils in Series. diam wire .020
(#14) Single Coil. Length 2 in.
Diam $3\frac{3}{4}$ in. Core diam. ½ in.
Primary resis 6.05 ohms.
Layers 15 of .032 wire.
Secondary resis. 70.75 ohms.
Layers 22 of .015 wire.

---

15 5 grand

36)150(4 lbs —
144

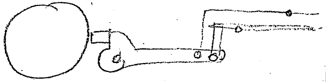
3,6
480
288 0
144
172 8.0



J. S. H. Jan 7 '86

(#15.) Single Coil. Length $3\frac{5}{8}$ in.
Diam. $4\frac{1}{8}$ in. Core diam $\frac{3}{4}$ in.
Primary resis 1.23 ohms
Layers 14 of .061 wire
Secondary resis 77.5 ohms
Layers 22 of .020 wire.

(#16.) Single Coil. Length $3\frac{1}{2}$ in.
Diam. $4\frac{1}{8}$ in. Core diam $\frac{3}{4}$ in.
Primary resis. 4.25 ohms.
Layers 20. of .041 wire.
Secondary resis 78. ohms
Layers 24. of .014 wire



(#17.) Single Coil. Length 3½ in.
Diam 4¼ in. Core diam 1½ in.
Primary resis 4.25. ohms
15 layers of #18 B.&S. wire.
Secondary resis. 78. ohms.
20 layers of #24 B.&S. wire.

(#18.) Single Coil. Length 4 in.
Diam. 1½ in. Core diam ½ in.
Primary resis. .030. ohms.
Three .045 wires multiple
Secondary resis. 125. ohms.
Diam wire .008

J. F. Ott Jan 7. 86.

(#19.) Three regular sized Coils with primaries in multiple + Secondaries in Series

Total primary resis. 130 ohms
Diam wire .042

Total Secondary resis. 137. ohms
Diam wire .005

(#20.) $\frac{74}{100}$ ohm primary Coil.
Length 7 in. Diam. 2 in.
Core diam. 1 in.
Diam wire .089

(#21.) J. F. Ott Jan 7" 86.

Two Coils with primaries in multiple + secondaries arranged able to be connected in multiple or series. Length of each 1½ in Diam 2½ in. Core diam ⅝ in.
Total pri. resis 1.60 diam wire .025
Sec. resis 56 + 54 ohms. diam wire .014

(#22.) Two primary Coils in multiple, each of 15 layers, divided in 7 sections of 2 layers + one of one.
Length of each coil 1½ in
Diam 1½ in. Core diam ⅝ in.
diam wire .025. Resis of one 3.14
Resis of other 3.98 ohms.

J. F. Ott Jan 7 '86

(#23.) Single Coil. Length 4 in.
Diam 1½ in. Core diam ½ in.
Primary resis 7. ohms Layers 7 of .022 wire
Secondary resis 150. diam wire .019

(#24.) Single Coil. Length 5⅜ in.
Diam 3 in. Core diam ¾ in.
Sec. resis 1858. ohms
Layers 38 of #32 B&S. wire
Different Primaries.

Jan 14, 85 J.O.M.

Two Cast Iron Telephones, with adjustible cores, on silk caps, such as used in Telephone Exchange,

Two the same to be used as hand phones with diff thickness diaphrams

---

One Bergman receiver, with large spool, resistance 124 Ohms

One Condenser 6 x 10 with 8 sheets connected so as to use from one to 8 sheets

Made Four Telephones same as used by Telephone switch men, with soft iron cores of diff sizes, made of very fine Iron wire

J. F. Ott

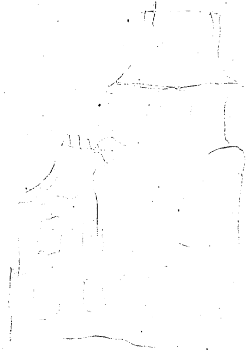
EH

Delivered to the RR T&T Co
2 Long distance telephone transmitters for experimental purposes — Jany 27 —

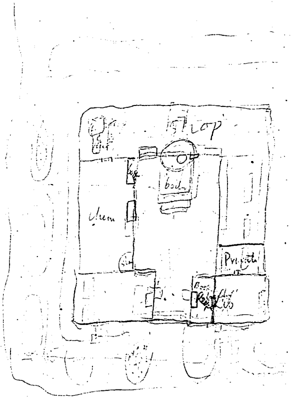
Jan 30. 86

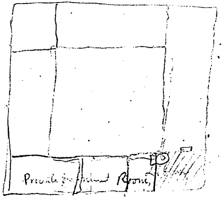
Delivered to R. N. [illegible] one complete cabinet –

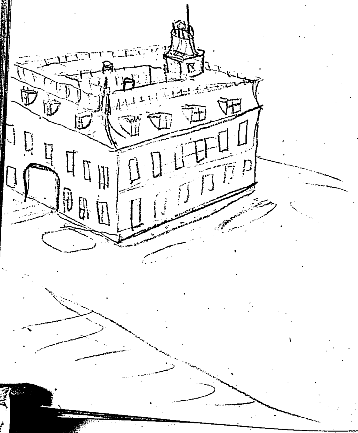
J. [illegible]



7500

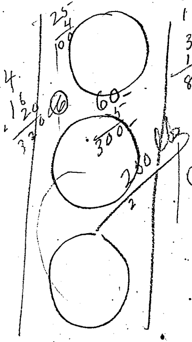



Provide for
Room,



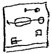
125 lb

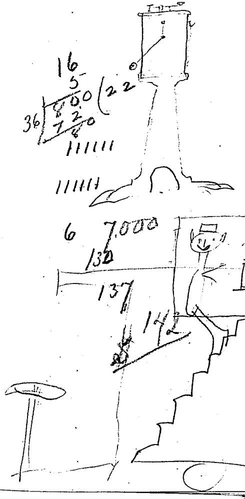
300
150
15
320
100
845



250 lb
227

16
5
36 | 800 (22
72
80





6 7,000
132
137

006.

50 ,25

10

25
50
1250

10
250

12
6

$\frac{25}{37000}$ to foot

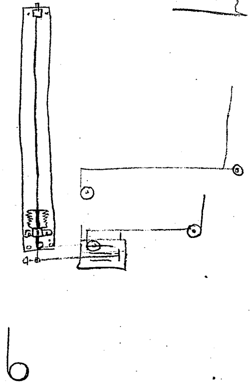
$\frac{1}{4}$

$\frac{1}{2}$ $1\frac{1}{2}$.

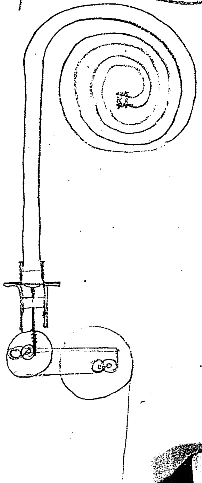
45 deg $\frac{15}{1000}$.

Regulation Compensation Mass
by Expansion Feby 3rd 1886

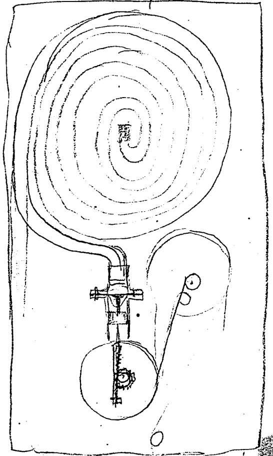
TAE

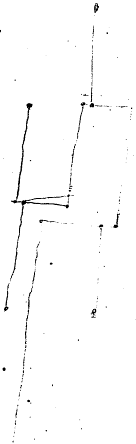


Reglm temp of House by Expansion, Feby 3rd 1880 TAE



Regltn temperature House
by expansion liquid —
Feby 3rd 1886 TAE

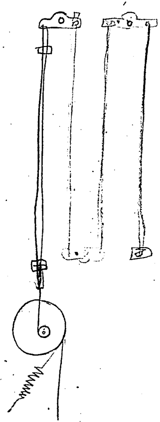




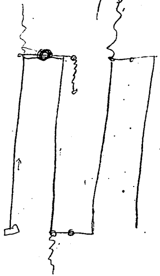
Regulation Compensation

Hand — Feby 3rd 1886

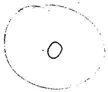
TAE



Regulation Compensation
House Feby 3rd 1886
TAE



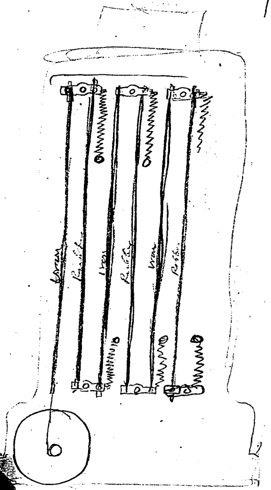
1.



Regulation Temperature Houses

Feby 3rd 1886

TAE

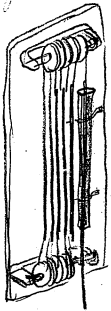


Feby 3rd 1886

TAE

Compounding Hard Rubber

Rods so Expansion regulate hot air grate in furnace



Expansion Zinc

1 in 336.

Iron — 1 in 846.

glass 1 in 1248

water increases $\frac{1}{9}$ in bulk from 32° to 312

mercury $\frac{1}{65}$ —

12 -	336
6 -	168.
3 -	84
$1\frac{1}{2}$ -	42.

Feby 6 1886

Gave instructions to John Ott to make another wick between the 2 wicks of the Regular Sperm oil hand Lantern used on Railroads This central wick dipping into a reservoir of Kerosine within the oil can = This will more than double the brilliancy of the Lamp, cannot blow out & is very cheap

---

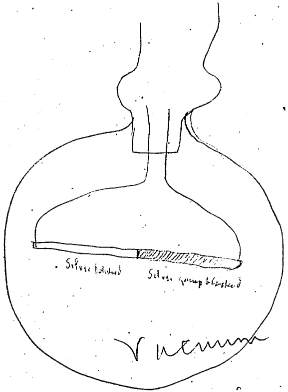
also to use in reg Kerosene Lamp a capillary space flat & adjustable, so Kerosene is burnt in thin sheet without wick by capillary action

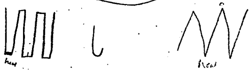
Theory is that one junction blackened absorbs heat, other polished reflects heat —

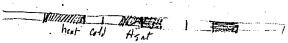
Thermo

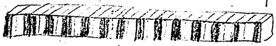
Feby 6 1886

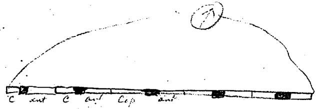
TAE





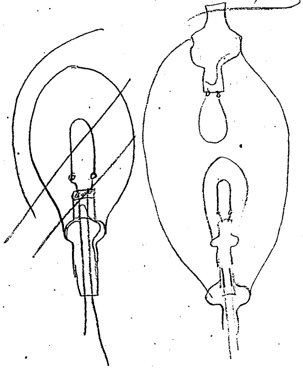






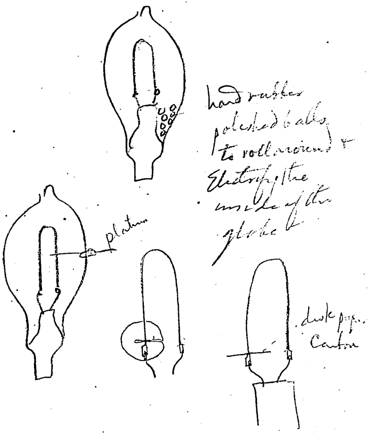
Radiant heat
light

Lamp factory Expmts
Feby 6 1886 TAE

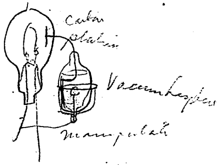


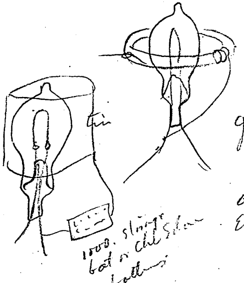
One lamp within the other

Feby 6 1886 TAE



Feby 6 1886 TAE



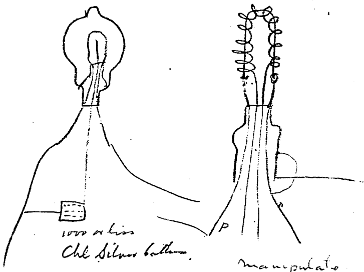


glass ring
foil rushed for Earth
outside
Electrified

Spring

Catalogue.

Feby 6 1886 T.A.E.



Try fibres cut from ferns stalks, they are palms

also orchid flower stocks

Feby 6 1886 TAE

Roll Licorice out in sheets and Carbonize. — dip paper in hot liquid Licorice, scrape dry & cut regular

grind the fine Carbzd Lampblack up with Licorice; roll in sheets & Stamp out, —

Boiled Hydrogen deposit Boron, in filament —

87,000
40,000
50,000
100,000
50,000
75,000
20,000
40,000
20,000
482,000,

87,000
30,000,
80,000
500,000
200,000
580,000
500,000
50,000
100,000
40,000
2,167,000.

45000
42000
87000,

6

10

95
85

77

42

10,

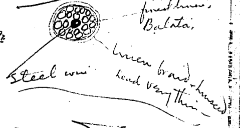
92

6

Feby 6 1886 TAE

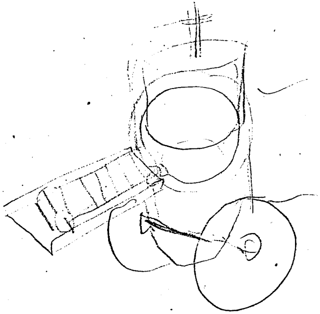
Fibres boiled in Licorice =

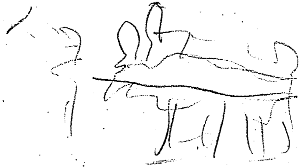
Torpedo wire



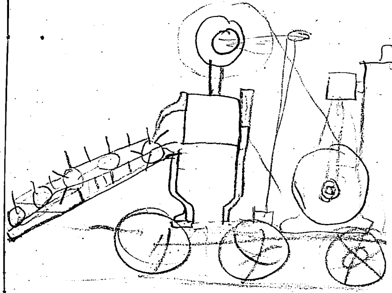
Try thin Celluloid Elastic as possible - fine relay wire + Central phos bronz - whip cord braid -

Feby 6 1886 TAE





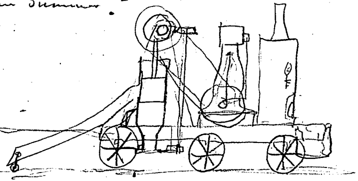
Feby 6 1886



Feby 6 1886 TAE

St Cleaning -

Machine for gathering snow + compressing it to ice + dropping definite blocks in gutter as horses advance apparatus Blocks ice being used for Radiating cold in Summer.



Feby 12 1886

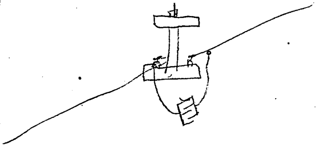
Phonoplex

Wind a 7 ohm or less coil
with bare wire with hard
thread very much spiraled
so as to give nearly all air
space between wire so coil
will charge + discharge
quicker ~

Feby 12 1886 TAE

To obviate induction

arrange condenser thus

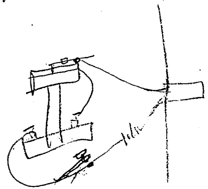


graduate the condenser so it will
allow regular current to lift
weight but not the induction
current.

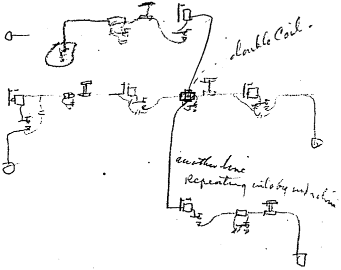
Feby 12 1886

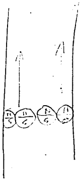
Phonoplex

Try this for vibrator for
RR Lehigh



Feby 12 1884
TAE

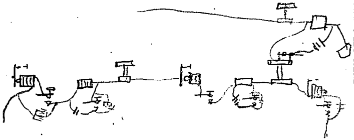


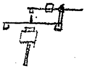


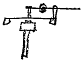
Feby 12 1886

TAE

Phonoplex Repeating

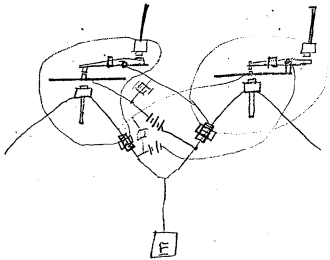




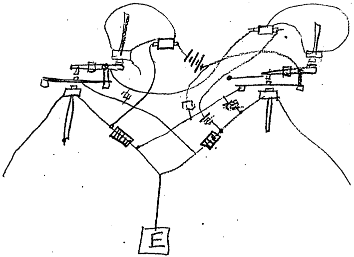


Feby 12 1886

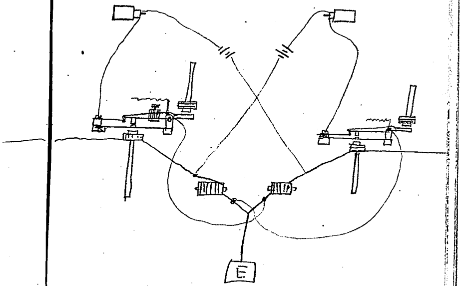
Phonoplex Repeater

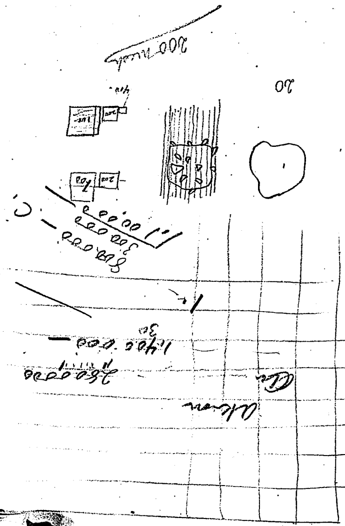


Feby 12 1886 Phonoplex Repeater

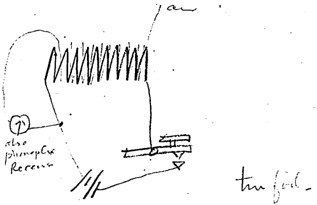


Feby 12 1886 7 a m
Phonoplex Repeater

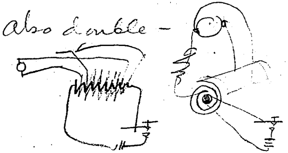


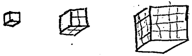


Induction coil + Condenser Combined Tiny Expmt



also double -





1   1/2 $\frac{1}{4}$

$24\frac{1}{2}$ – $6\frac{1}{2}$

$96\frac{1}{4}$ $24\frac{1}{4}$ $6\frac{1}{4}$ Surface

~~[illegible]~~

$64\frac{1}{4}$

8   1

If you 1/2 a Cube all direction

Surf diminishes at square or $\frac{1}{4}$

Weight $\frac{1}{8}$

Surf	bulk
96 –	64
24	8
6	1

$\frac{16}{16}$ 96 $\frac{16}{256}$

~~100~~ ~~[illegible]~~

16 / 6 / 6

$\frac{1}{12}$ bulk

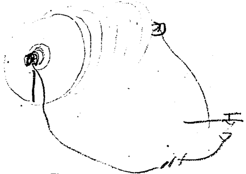
$\frac{1}{8}$ weight

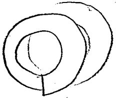
1/2 or $\frac{1}{4}$ surface $\frac{1}{8}$ bulk

$\frac{1}{4}$ $\frac{1}{16}$ surface $\frac{1}{64}$ bulk

Feby 12 1886 TAE

Induction coil & Condenser Combined





paper with foil
pasted on side
wound spirally
& double

105 - ohms 2 mf
210 " 1
420 1/2
840 1/4
1680. 1/8 -

3/16 -

5200 60
7
60) 364.00. (600
360
4

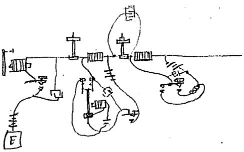
6) 600 square feet,
60 — 1/50

60 sq feet,

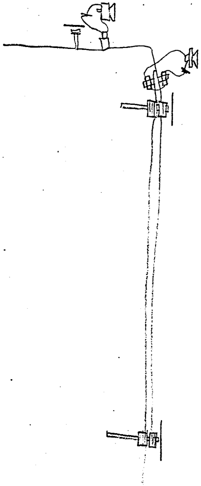
.15 2
7
1.05

Feby 13 1886 TAE

Tri-phonoplex

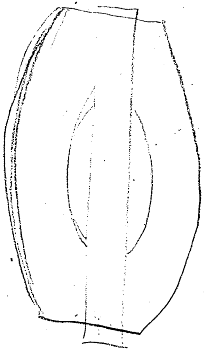


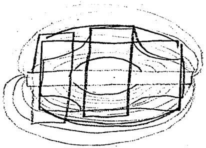
Two phonos one has regular weight the other a very small weight & limited, two primary coils 7 ohm each have local battery one is regular phonoplex sender — the other a reed giving musical note which is interrupted by Key — The reed point is shunted by Condenser to give sharpness, — Thus besides the Morse two other distinct form of signals used. The weak rapidly occurring musical waves cannot lift the heavy weight of the phonoplex phone while the light weight on the other phone responds, the sudden thumps of reg phono doesn't stop the note:

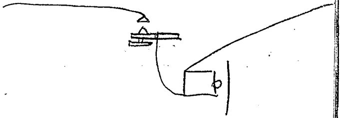


[illegible]
[illegible]

Northern Railroad of N. J. [illegible]
Jersey Northern [illegible]
Northwestern Telegraph Company
Northwestern Telegraph Co
Licking Valley
Wabash Valley Railroad
Lorenzo Dow [illegible] Co





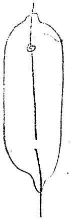


4c 16) 520 (32.5
48
40
32
8

16) 212 (13.$\frac{1}{4}$ — 16) 700 (43.
16 64
52 60
48 48
4 12

32.

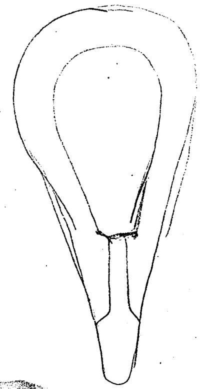
25 250
5 125,000

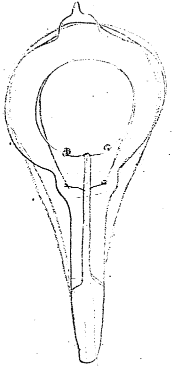


16) 1000 (62.5
96
40
32
8

82 / 72

30) 740 (24
60
140
120





mg
7000 ~~gr~~ gr or $\frac{1}{3}$ at titre

2900/450

2.40. 29000/

1 mg $\frac{1}{7000}$
14000
28000
56000

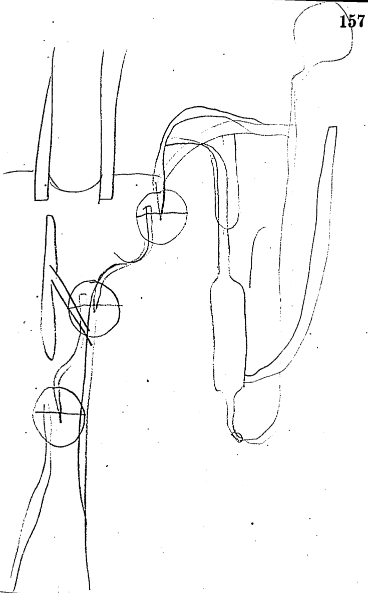
1/2

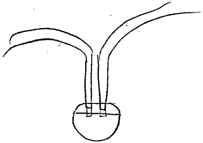
1/6

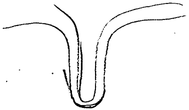
$\frac{15}{16}$
90

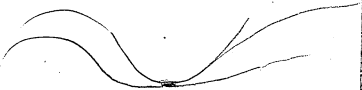
$\frac{15}{240}$

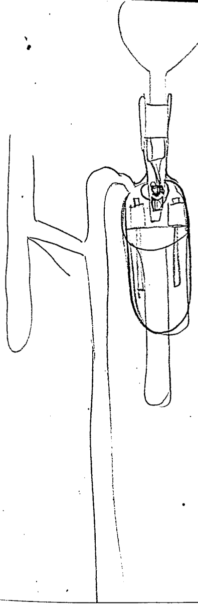
32
$\frac{32}{64}$
$\frac{96}{1024}$











$10.\cancel{000000000} \big) 2\,\cancel{000{,}000{,}000{,}000{,}000}\ \big($ 200000

$40 \big) 70.000 \big(1750$
40
300
240
200
200

$40 \big) 20.000.000 \big(5.000.000$
40
20,00,0,000

50

40.

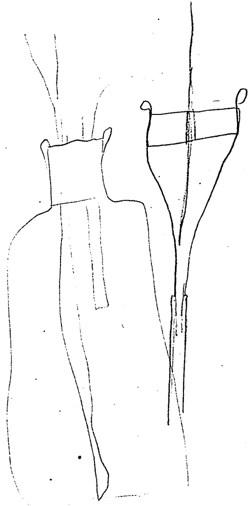
4.~~000,000,000~~

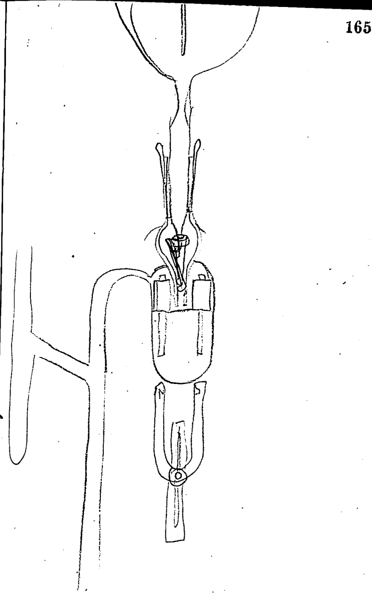
40 Billion Water with .2 pct SO_4

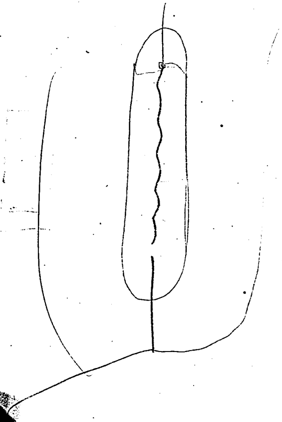
10,000,000,000 glass

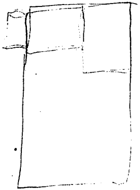
2.~~000.000.000.000.000~~

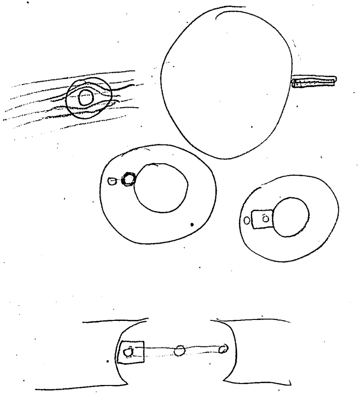
7.~~000,000,000~~





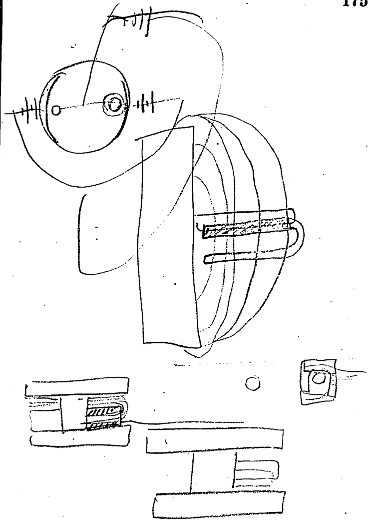


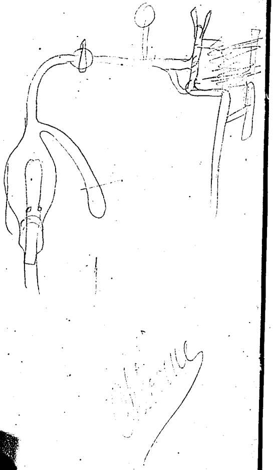


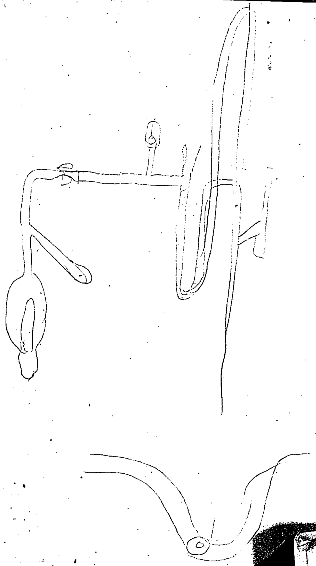


40

50
20 times as
much







Horizontal force – DEL

h.

66.65 Zero.

0 millimeter	1 mm	2	3 mm			
8.14	7.87	6.97	5.83			
.4	5	.6	.7	8	9	
4.66	3.25	1.94	.59	Zero	.37	
10	11	12	13	14	15	16
.69	1.39	1.84	2.09	2.78	3.03	3.47
17	18	19	20	21	22	23
3.50	3.92	4.41	5.57	6.18	7.10	7.87

~~7444~~ 6665 8.14

7452 6665 7.87

7222 6665 5.57

7283 6665 6.18

7106 6665 4.41

7375 6665 7.10

6968 6665 3.03

6874 6665 2.09

7012 6665 3.47

6743 6665 2.78

6849 6665 1.84

6702 6665 .37

7362 6665 6.97

7131 6665 4.66

7057 6665 3.92

7015 6665 3.50

6734 6665 .69

7248 6665 5.83

7452 6665 7.87

6724 6665 .59

6859 6665 1.94

6804 6665 1.39

gary

Zero 5366

0	1	2	3	4	5	6
9.20	9.17	8.26	6.65	4.87	2.99	1.79
7	8	9	10	11	12	13
.78	.14	Zero	.10	.03	.64	.74
14	15	16	17	18	19	20
1.16	1.61	2.21	2.23	2.42	3.17	4.73
21	22	23				
6.20	7.51	8.56				

6286 5366 9.20

6283 5366 9.17

6192 5366 8.26

6031 5366 6.65

5853 5366 4.87

5665 5366 2.99

5545 5366 1.79

5444 5366 .78

5380 5366 .14

5376 5366 .10

5369 5366 .03

5482 5366 1.16

5527 5366 1.61

5587 5366 2.21

5589 5366 2.23

1.16

5986 5366 6.20

5839 5366 4.73

5608 5366 2.42

5683 5366 3.17

6222 5366 8.56

6117 5366 7.51

6

 Feby H.F.

Zero 5057

0	1	2	3	4	5	6	7	8
9.29	9.22	7.50	5.20	3.55	2.18	1.07	.30	Zero

9	10	11	12	13	14	15
.23	.09	.85	1.28	1.98	2.14	2.24

16	17	18	19	20	21	22	23
2.45	2.63	2.77	3.19	4.49	5.88	7.18	8.35

5985 − 5057 = 9.28; 5979 − 5057 = 9.22; 5807 − 5057 = 7.50; 5577 − 5057 = 5.20; 5412 − 5057 = 3.55; 5275 − 5057 = 2.18

5164 − 5057 = 1.07; 5087 − 5057 = .30; 5080 − 5057 = .23; 5066 − 5057 = .09; 5142 − 5057 = 185; 5185 − 5057 = 1.28

5254 − 5057 = 1.98; 5271 − 5057 = 2.14; 5281 − 5057 = 2.24; 5302 − 5057 = 2.45; 5320 − 5057 = 2.63; 5334 − 5057 = 2.77

5376 − 5057 = 3.19; 5506 − 5057 = 4.49; 5645 − 5057 = 5.88; 5775 − 5057 = 7.18; 5892 − 5057 = 8.35

981 + 207 = 11.88

HF March

Zero 5264

0	1	2	3	4	5	6	7	8
9.81	9.59	8.65	6.83	4.83	2.93	1.58	.36	.31

9	10	11	12	13	14	15	16
Zero	.17	.37	.86	1.56	2.06	1.98	2.26

17	18	19	20	21	22	23
2.54	2.74	3.21	4.04	5.48	7.09	8.93

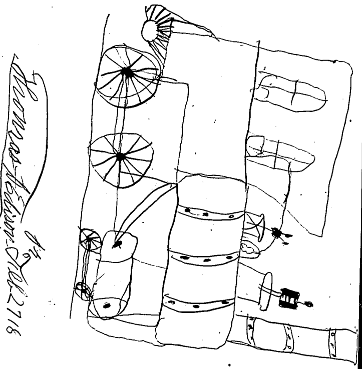
6245 − 5264 = 9.81; 6223 − 5264 = 9.59; 6129 − 5264 = 8.65; 5947 − 5264 = 6.83; 5747 − 5264 = 4.83; 5557 − 5264 = 2.93

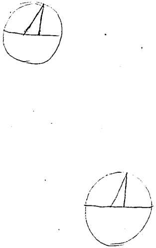
5422 − 5264 = 1.58; 5300 − 5264 = .36; 5295 − 5264 = .31; 5281 − 5264 = .17; 5301 − 5264 = .37

5350 − 5264 = .86; 5420 − 5264 = 1.56; 5470 − 5264 = 206; 5462 − 5264 = 1.98; 5490 − 5264 = 2.26

5518 − 5264 = 2.54; 5538 − 5264 = 2.74; 5585 − 5264 = 3.21; 5668 − 5264 = 4.04; 5812 − 5264 = 5.48

5973 − 5264 = 7.09; 6157 − 5264 = 8.93





 Zero ·5172 HF April -

0	1	2	3	4	5	6	7	8	9	10
12.19	11.89	9.83	7.95	4.82	2.97	1.26	.38	zero	.21	.74

11	12	13	14	15	16	17	18
.94	2.06	2.64	4.74	4.10	4.27	4.70	5.02

19	20	21	22	23
5.47	5.98	7.46	9.40	11.30

6391 5172 12.19	6361 5172 11.89	6155 5172 9.83	5867 5172 7.95	5654 5172 4.82	5469 5172 2.97
5298 5172 1.26	5210 5172 .38	5193 5172 .21	5246 5172 .74	5266 5172 .94	5378 5172 2.06
5436 5172 2.64	5546 5172 4.74	5582 5172 4.10	5599 5172 4.27	5642 5172 4.70	5674 5172 5.02
5719 5172 5.47	5770 5172 5.98	5918 5172 7.46	6112 5172 9.40	6302 5172 11.30	

12.19
1.15
13.34

5569 Zero HF May

0	1	2	3	4	5	6	7
10.00	9.74	8.69	6.57	4.58	3.25	2.28	1.67

8	9	10	11	12	13	14	15
.89	.69	.58	zero	.06	1.77	1.77	2.29

16	17	18	19	20	21	22	23
2.68	2.88	3.29	3.35	3.95	5.18	6.92	8.83

6569 5569 10.00	6543 5569 9.74	6438 5569 8.69	6226 5569 6.57	6027 5569 4.58	5894 5569 3.25
5797 5569 2.28	5736 5569 1.67	5658 5569 .89	5638 5569 .69	5627 5569 .58	5575 5569 .06
5746 5569 1.77	5746 5569 1.77	5798 5569 2.29	5837 5569 2.68	5857 5569 2.88	
5898 5569 3.29	5904 5569 3.35	5964 5569 3.95	6087 5569 5.18	6261 5569 6.92	
6452 5569 8.83					

74.3
74.2
77.0
3)223.5
75.1

Zero 6042 HF June

0	1	2	3	4	5	6	7
7.90	7.76	6.21	4.25	2.71	1.65	.91	.20

8	9	10	11	12	13	14	15
.04	zero	.51	.09	.29	.34	.45	1.16

16	17	18	19	20	21	22	23
1.31	1.27	1.87	2.32	2.54	3.56	5.21	6.87

6832 − 6042 = 7.90
6818 − 6042 = 7.76
6663 − 6042 = 6.21
6467 − 6042 = 4.25
6313 − 6042 = 2.71
6207 − 6042 = 1.65

6133 − 6042 = 91
6062 − 6042 = .20
6046 − 6042 = 04
6093 − 6042 = .51
6051 − 6042 = .09

6071 − 6042 = .29
6076 − 6042 = .34
6087 − 6042 = .45
6158 − 6042 = 1.16
6173 − 6042 = 1.31

6169 − 6042 = 1.27
6229 − 6042 = 1.87
6274 − 6042 = 2.32
6296 − 6042 = 2.54
6398 − 6042 = 3.56

6563 − 6042 = 5.21
6729 − 6042 = 6.87

130°

9.85
7.90
17.75

 Zero 6361 HF July

0	1	2	3	4	5	6	7
8.69	8.34	6.71	4.90	3.31	2.14	1.30	.16
8	9	10	11	12	13	14	15
zero	.26	.35	.79	1.24	1.93	2.19	2.77
16	17	18	19	20	21	22	23
3.17	4.21	3.75	4.03	4.62	5.50	6.90	8.39

7230 6361 8.69	7195 6361 8.34	7032 6361 6.71	6851 6361 4.90	6692 6361 3.31	6575 6361 2.14
6491 6361 1.30	6377 6361 .16	6387 6361 .26	6396 6361 .35	6440 6361 .79	6485 6361 1.24
6554 6361 1.93	6580 6361 2.19	6638 6361 2.77	6678 6361 3.17	6782 6361 4.21	6736 6361 3.75
6764 6361 4.03	6823 6361 4.62	6911 6361 5.50	7051 6361 6.90	7200 6361 8.39	

1304
869
21.73

Zero 7991 Aug HF

0	1	2	3	4	5	6	7
9.30	8.90	7.35	5.75	3.67	2.08	.99	.43
8	9	10	11	12	13	14	15
zero	.07	.52	.86	1.03	1.65	1.71	2.00
16	17	18	19	20	21	22	23
2.52	2.73	3.00	3.58	3.92	4.81	6.68	8.18

8921 7991 9.30	8881 7991 8.90	8726 7991 7.35	8566 7991 5.75	8358 7991 3.67	8199 7991 2.08	8090 7991 .99
8034 7991 .43	7998 7991 7	8043 7991 .52	8077 7991 .86	8094 7991 1.03	8156 7991 1.65	
8162 7991 1.71	8191 7991 2.00	8243 7991 2.52	8264 7991 2.73	8291 7991 3.00		
8349 7991 3.58	8383 7991 3.92	8472 7991 4.81	8659 7991 6.68			
8809 7991 8.18						

2934
930
38.64

7798 HF Sept

0	1	2	3	4	5	6	7
9.69	9.67	8.50	6.74	4.82	4.04	1.19	.90

8	9	10	11	12	13	14	15
.21	zero	.48	.83	1.21	2.27	2.84	3.40

16	17	18	19	20	21	22	23
3.49	3.63	3.67	3.94	4.27	5.25	6.84	8.22

8767 − 7798 = 9.69
8765 − 7798 = 9.67
8648 − 7798 = 8.50
8472 − 7798 = 6.74
8280 − 7798 = 4.82
8102 − 7798 = 4.04
7917 − 7798 = 1.19
7888 − 7798 = .90
7819 − 7798 = .21
7846 − 7798 = .48
7881 − 7798 = .83
7919 − 7798 = 1.21
8025 − 7798 = 2.27
8082 − 7798 = 2.84
8138 − 7798 = 3.40
8147 − 7798 = 3.49
8161 − 7798 = 3.63
8165 − 7798 = 3.67
8192 − 7798 = 3.94
8225 − 7798 = 4.27
8323 − 7798 = 5.25
8482 − 7798 = 6.84
8620 − 7798 = 8.22

2741
969
3710

Zero 7710 HF Oct

0	1	2	3	4	5	6	7
8.98	7.38	6.13	4.79	3.31	2.00	.83	.62

8	9	10	11	12	13	14	15
.12	zero	.05	.56	.78	1.41	1.77	2.35

16	17	18	19	20	21	22	23
2.40	2.56	2.60	2.71	3.65	5.18	6.97	7.91

8508 − 7710 = 8.98
8448 − 7710 = 7.38
8323 − 7710 = 6.13
8189 − 7710 = 4.79
8041 − 7710 = 3.31
7912 − 7710 = 2.02
7793 − 7710 = 83
7772 − 7710 = .62
7722 − 7710 = .12
7715 − 7710 = .05
7766 − 7710 = 56
7788 − 7710 = 78
7851 − 7710 = 141
7887 − 7710 = 1.77
7945 − 7710 = 2.35
7950 − 7710 = 2.40
7966 − 7710 = 2.56
7970 − 7710 = 2.60
7981 − 7710 = 2.71
8075 − 7710 = 3.65
8228 − 7710 = 5.18
8407 − 7710 = 6.97
8501 − 7710 = 7.91

2653
896
3551

 7229 HF Nov -

0	1	2	3	4	5	6	7
8.69	8.29	7.40	5.95	4.46	3.12	1.90	.69

8	9	10	11	12	13	14
.21	zero	.17	.59	1.16	1.64	2.12

15	16	17	18	19	20	21	22	23
2.30	2.41	2.69	2.88	3.42	4.58	6.02	7.13	8.08

8098 − 7229 = 8.69; 8058 − 7229 = 8.29; 7969 − 7229 = 7.40; 7824 − 7229 = 5.95; 7675 − 7229 = 4.46; 7541 − 7229 = 3.12

7419 − 7229 = 1.90; 7298 − 7229 = .69; 7250 − 7229 = .21; 7246 − 7229 = .17; 7288 − 7229 = .59

7345 − 7229 = 1.16; 7393 − 7229 = 1.64; 7441 − 7229 = 2.12; 7459 − 7229 = 2.30; 7470 − 7229 = 2.41

7498 − 7229 = 2.69; 7517 − 7229 = 2.88; 7571 − 7229 = 3.42; 7687 − 7229 = 4.58; 7831 − 7229 = 6.02

7942 − 7229 = 7.13; 8037 − 7229 = 8.08

2172 + 869 = 3041

Zero — Dec. — 6665
Jany — 5366
Feby — 5057
March — 5264
April — 5172
May 5569
June 6042
July — 6361
Aug 7991
Sept 7798
Oct 7710
Nov 7229.

April Zero Lowest 5172

April zero
May 3.97 - mm from circle.
June 8.70 "
July 11.89 "
Aug 28.19 "
Sept 26.26
Oct 25.38
Nov 20.57
Dec 14.93
Jany 1.94

5366
5172
1.94

5569
5172
3.97

6042
5172
8.70

6361
5172
11.89

7229
5172
20.57

79.91
5172
28.19

7798
5172
26.26

7710
5172
25.38

6665
5172
14.93

8.14
16.08
24.22

981
207
11.88

309
920
12.29

February Zero - 5057

January	3.09 mm from Earth Circle " Zero
Feby	Zero
March	2.07
April	1.15
May	5.12
June	9.85
July	13.04
Aug	29.34
Sept	27.41
Oct	26 53
Nov	21 72
Dec	16.08

1608
814
24.22

7710
5057
26.53

5366
5057
3.09

5264
5057
2.07

7229
5057
21.72

5172
5057
1.15

5569
5057
5.12

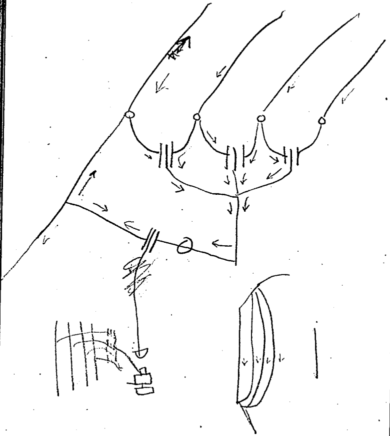
7991
5057
29.34

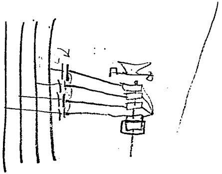
6042
5057
9.85

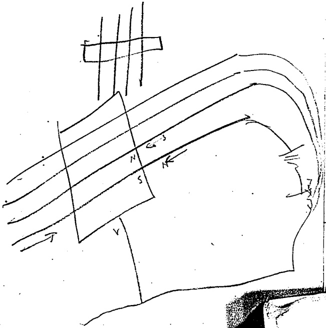
6361
5057
13.04

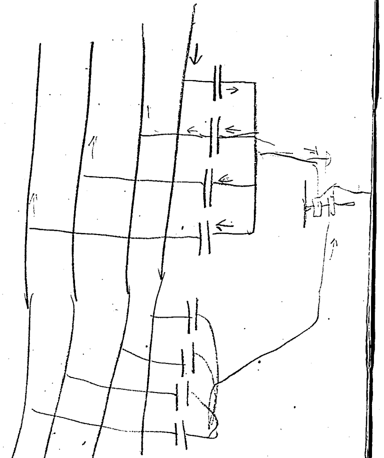
7798
5057
27.41

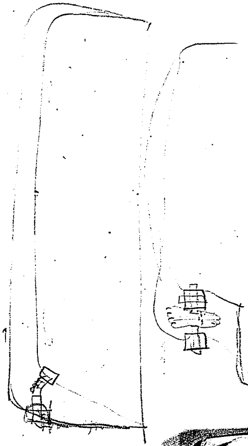
6665
5057
16.08

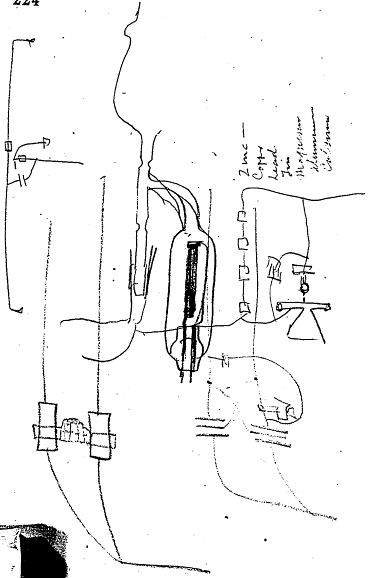


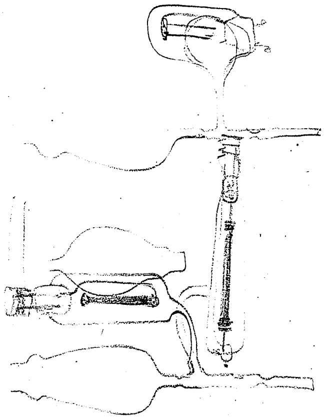


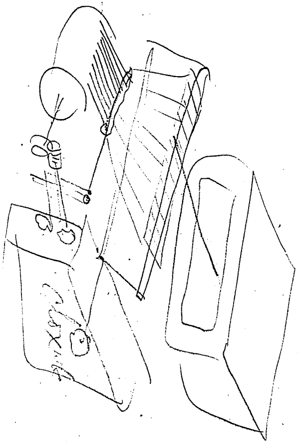







Zinc —
Copper
Lead
Tin
Magnesium
Aluminum
Cadmium





24) 104640 (4360
96
86
72
144
144

872000
3
261600 (104640

4360

25) 2616
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116
100
160
150
100
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109
8
8.72

61
365) 550000000 (1506849
365
1850
1825
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2190
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1800
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340

872000
348800

872000
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3488000
872000
12208000

184000000

23900

4360) 62743 (14.4
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19143
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17030

14.4
14.4
656

24) 1506849 (62743

144) 1010 (7.08
1008
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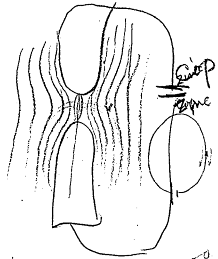
885092000



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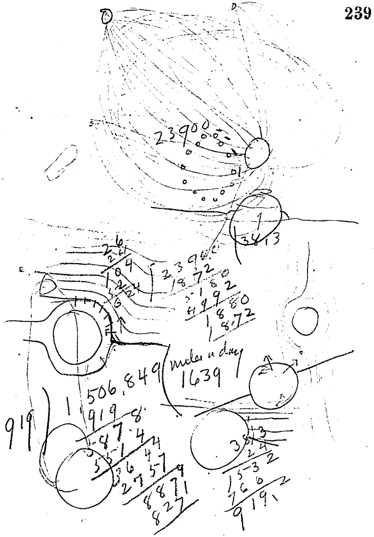

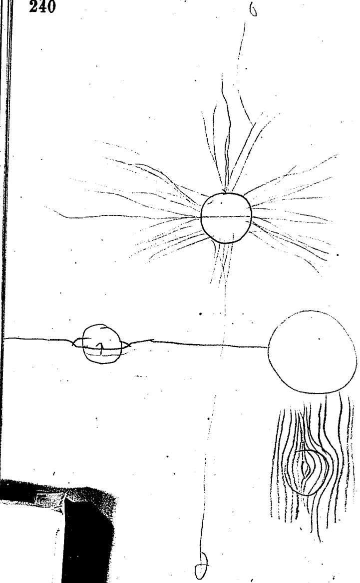

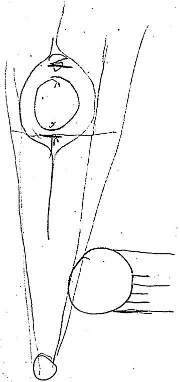

4 ok 10
20
2 40
4 80
.50 160
25 320
.12 640
6
.3

.03

33. 66

128

2

19)20000(1052
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220
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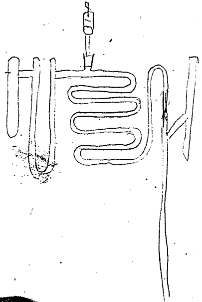
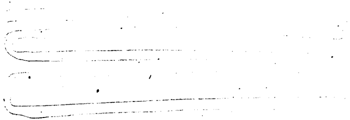
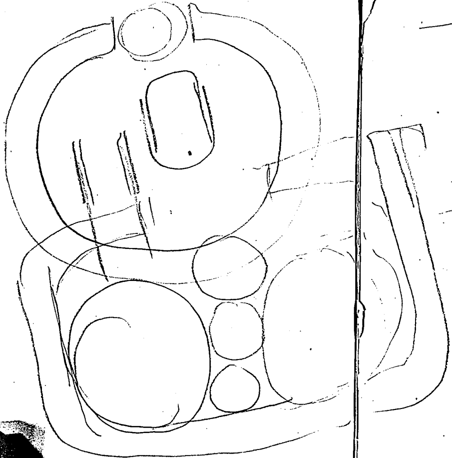
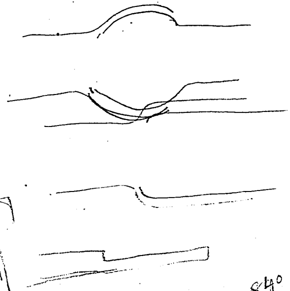








2000
44
180) 17
130
460
390
700
650
1840
(1,353,840

3300
40

Hgunseffe 2

481

64 Coffee Coffe

80 Coffee

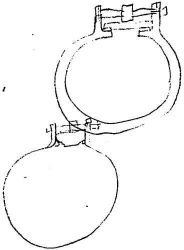
75
86

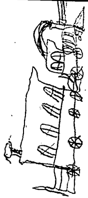
478

Coffee

4 36, 360

2360





yourad

6810

EDISON NN

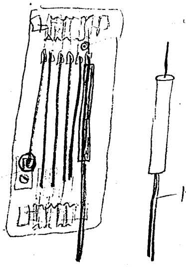
3468

284

.3 15

10 wheels

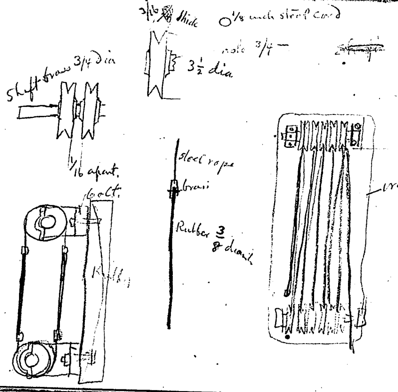
wheel



3 feet long 2 inches dia
thin brass tube pound
full load,

Rod 1/2 dia steel,

fastened.

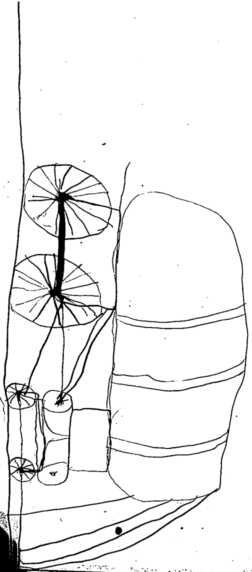


4 1/2 feet between Center + Center of wheels

336. feet 12 inches

$\frac{1}{2}$

212
1 32
12) 180, (15
12
60

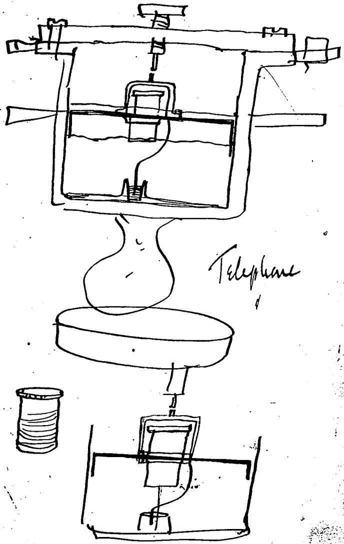


New York Notebook, N-85-10-03

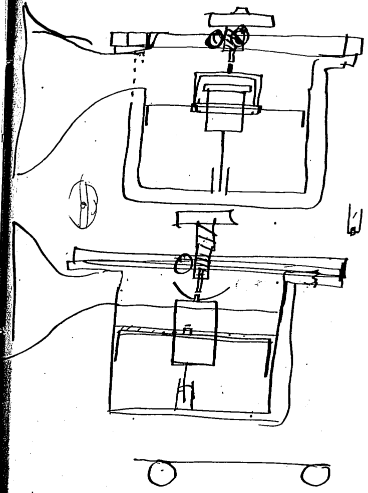
This notebook covers the period October-December 1885. Most of the entries are by Edison. The name of John F. Ott appears frequently as a witness. Included also are a few entries by H. DeCoursey Hamilton, which were witnessed by Martin Force. All of the notes and drawings relate to phonoplex and sextuplex experiments. The spine is labeled "25." The book contains 288 numbered pages.

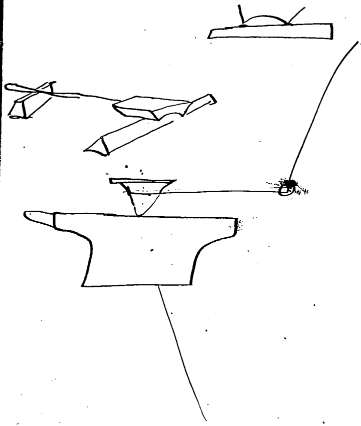
Blank pages not filmed: 76-287.

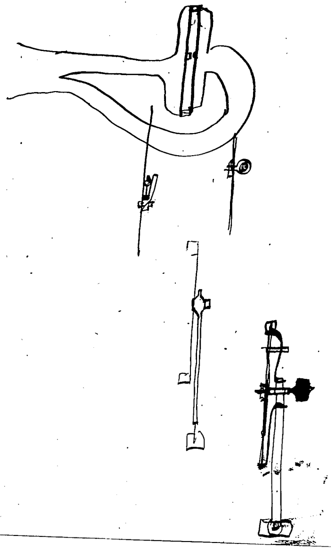
x E-172 N-85-10-03



Telephone

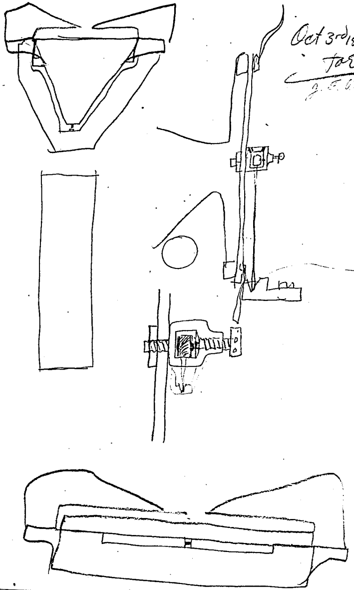




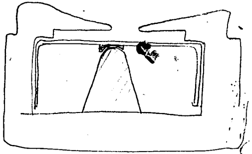


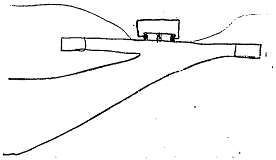
Frangipani

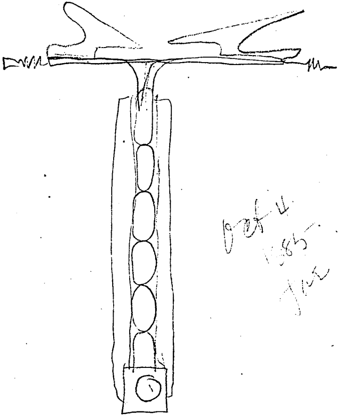
Oct 3rd 1885
TAE



Oct 4 1885
TAE

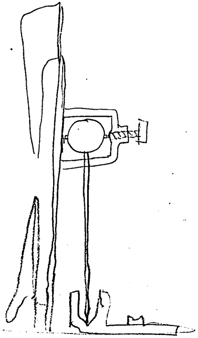






Oct 4
1885
TAE

Oct 4 1885
TAE



Oct 4 1883

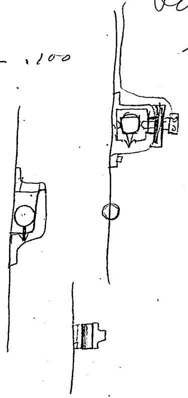
Tue

40.

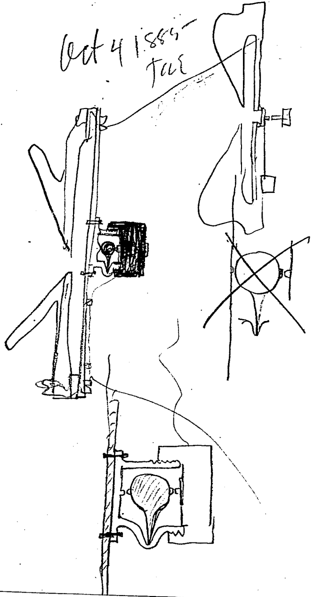
60 — .100

40.

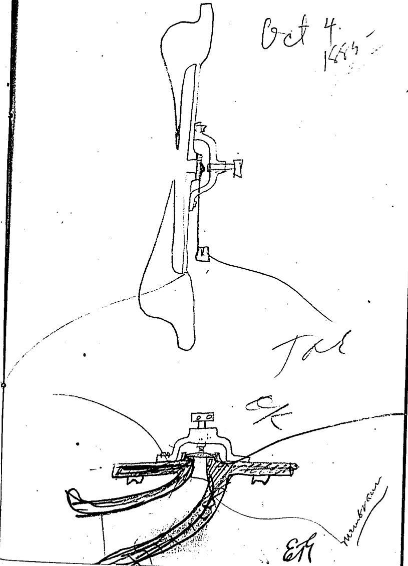
10.



Oct 4 1885
TAE



Oct 4.
1885



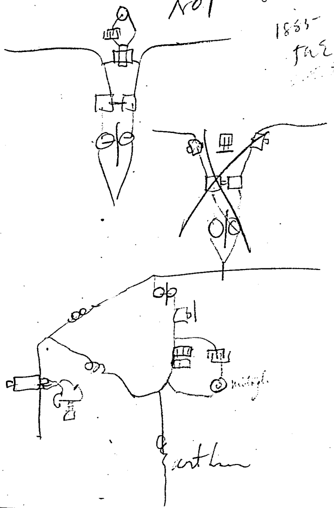
TAE

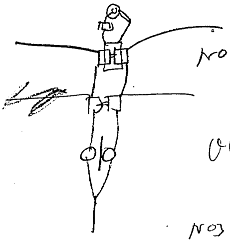
ok

EH

No 1

Oct 4
1885
TAE



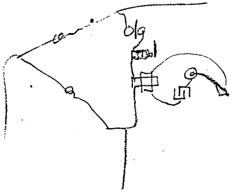


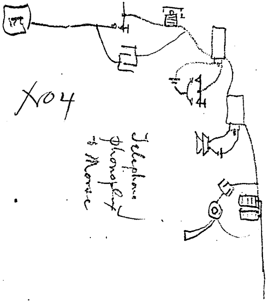
No 2

Oct 4 1885

Ta?

No 3



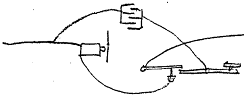


X04

Telephone + Phonoplex & Morse

Oct 4 1885

TAE



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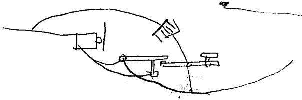
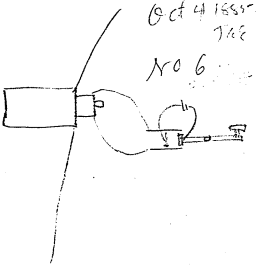
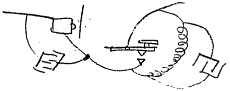
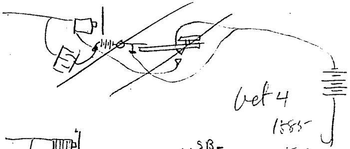


Oct 4 1885
TAE

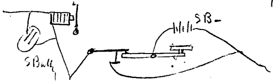
No 6

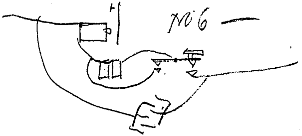


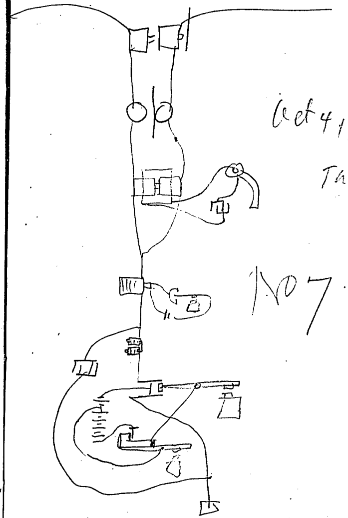




Oct 4
1885
TAE



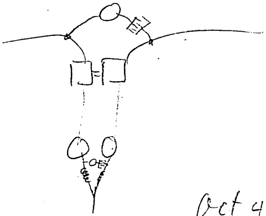




Oct 4 1885

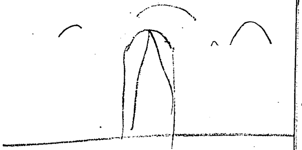
TA[illegible]

No 7 –



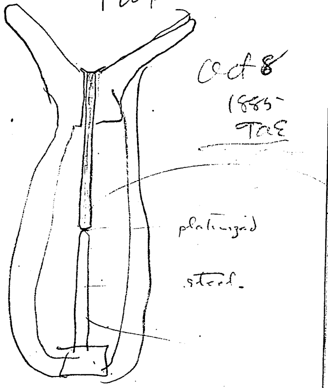
Oct 4 1883

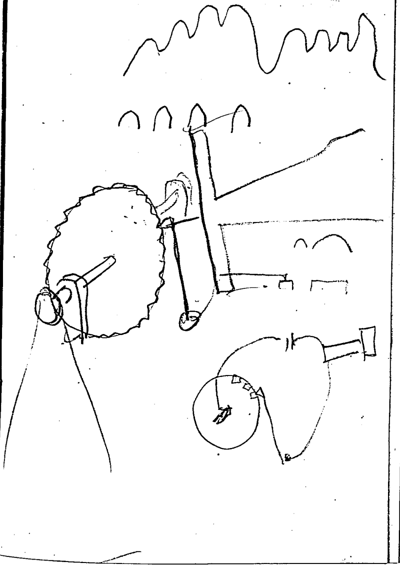
Jag



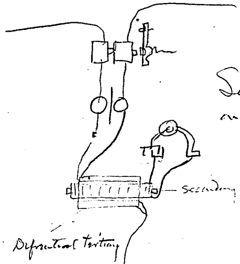
Telephone

Oct 8
1885
TAE





am trying to see what effect
musical sounds from RR
teligh will have on the
phonoplex & trying devices
to modify its action so the
2 systems will not interfere
with each other

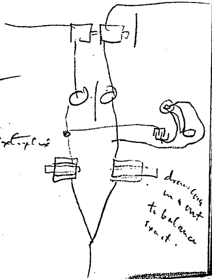


Sextuplex on phonoplex principle

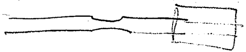
Oct 8 1885

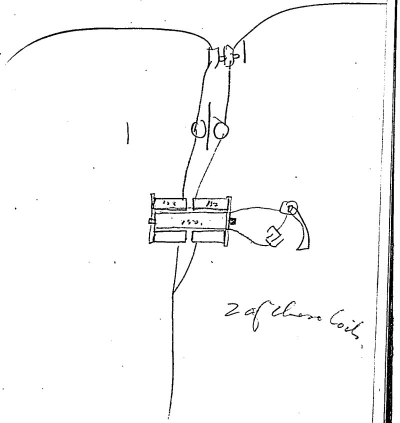
TAE

Sextuplex

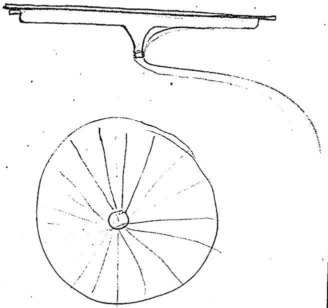


0.4 11,55



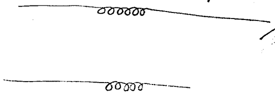


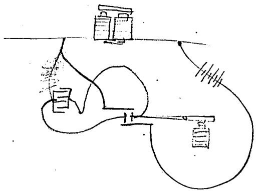
2 of these Coils



Phonoplex Oct 27 1885

TAE





Phono Plex Exp. Dec 14th /85.

Hoe. Hamilton.
M N Force

Making comparison between receiving instruments by shunting with condenser, Siemens form spool wound 282 ohms, iron diaphram $\frac{19}{1000}$ thick, steel pin, receives through 140 sheets of condenser.

Spool 99 ohms — 138 sheets

Spool 282 ohms · steel diaphram $\frac{12}{1000}$ — 138 sheets.

Russia Iron diaphram $\frac{19}{1000}$ thick — 164 sheets. — best so far.

Phonoplex continued Dec 15/85
HoeC Hamilton
Time

Russia Iron diaphram $\frac{12}{100}$ thick
not so good

Spool 50 ohms regular diaphra
works through 128 sheets

Hard rubber diaphram on 282 ohm
spool $\frac{31}{100}$ thick, with fine adjst.
works well through 300 sheets
but break up on taking out con-
denser & not sharp with only a
few sheets in.

Phonoplat. Dec 16" 1885
H. de C. Hamilton
White

Hard rubber diaphram $\frac{103}{1000}$ thick no good

German Silver diaphram $\frac{20}{1000}$ thick very nearly as good as Russia Iron.

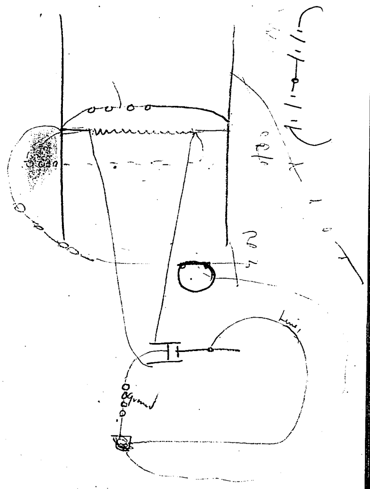
Brass diaphram $\frac{19}{1000}$ thick not so good as Iron.

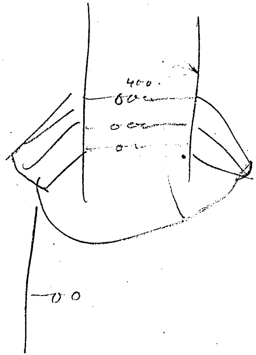
Copper diaphram $\frac{16}{1000}$ thick no good.

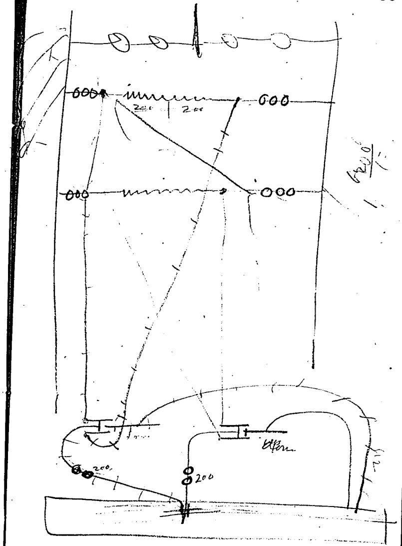
Brass diaphram $\frac{19}{1000}$ thick with Iron centre set in, Not so good as Russia Iron.

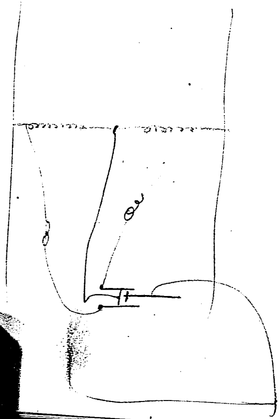
H. de C. Hamilton

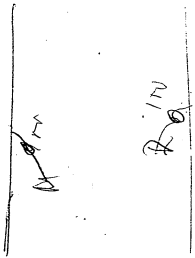
Wood diaphram (Spruce) $\frac{}{1,00}$ thick

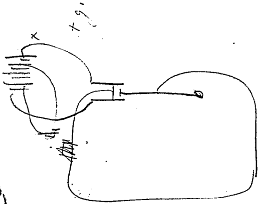

Ground
Line

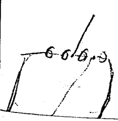


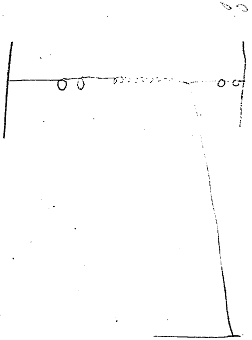


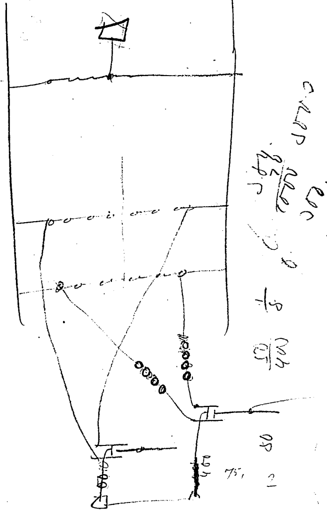


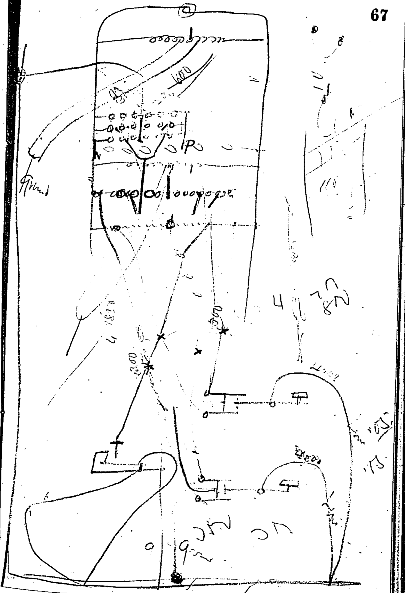


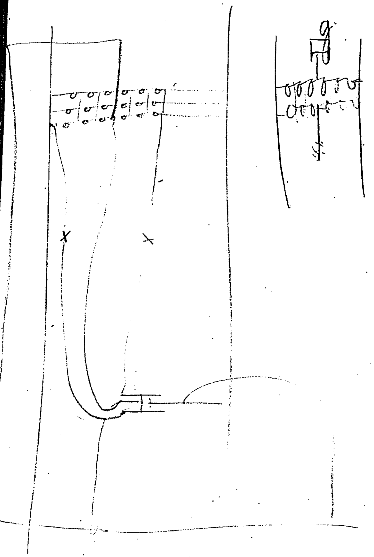








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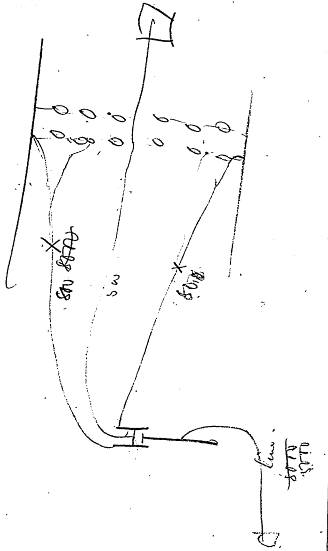
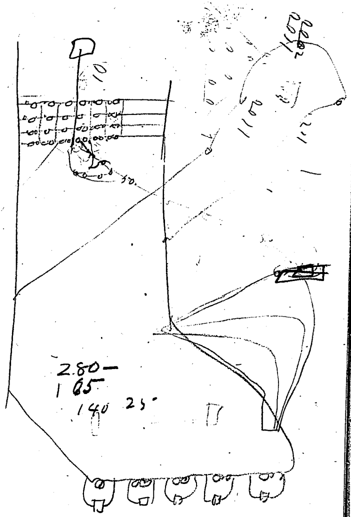
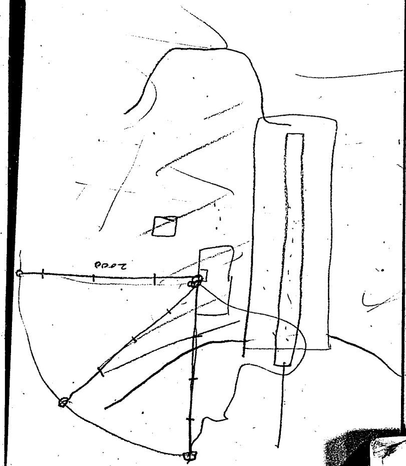




280
165
140 25



angels swimming in music
Dot banged her head on the piano

New York Notebook, N-85-12-06

This notebook covers the period December 1885-July 1886. There is also one entry from September 1888. All of the entries are by Edison except for one entry by an unknown assistant. Included are notes and drawings relating to armature windings and non-sparking commutators, engines and boilers for central station plants, lamp experiments, electric power distribution systems, and the phonograph. On page 290 is a list by Edison of competing electric light companies. The book contains 292 numbered pages.

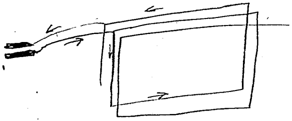
Blank pages not filmed: 16-17, 26-29, 58-59, 72-73, 76-77, 228-237.

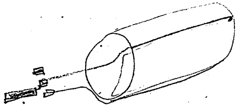
Missing page numbers: 1-2, 61-62, 79-102, 113-164, 203-212, 217-218, 239-252, 267-284.

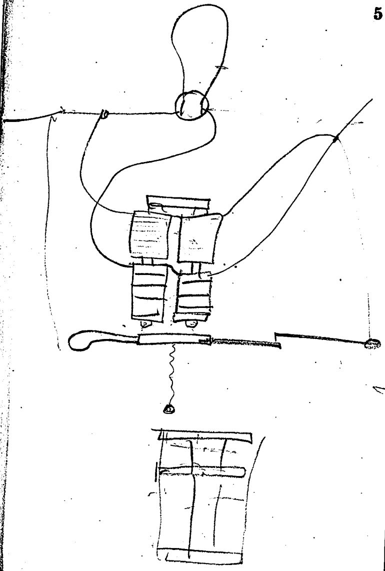
N-85-12-06

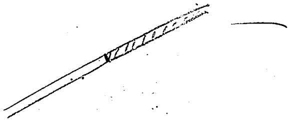
Dec 6 1885 N-85-12-06

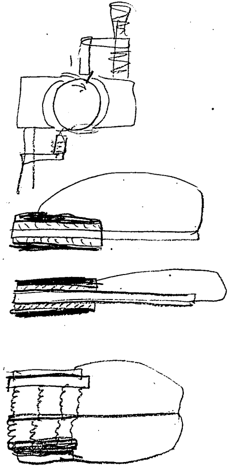
Non Sparking Commutator



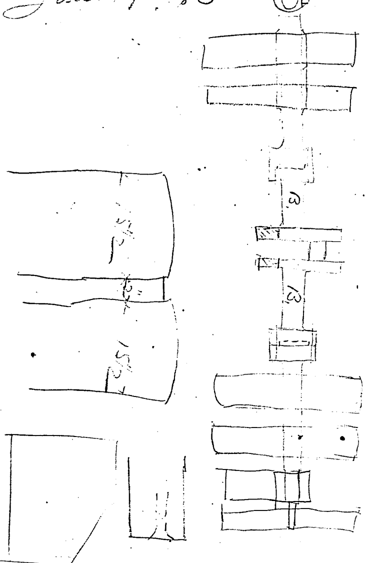




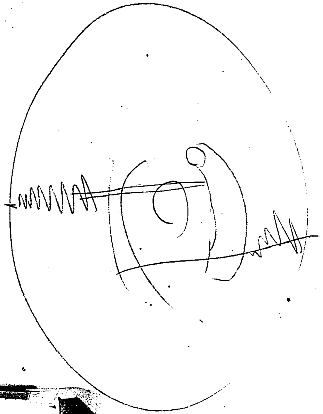




Jan 17 - 86



 Jan. 17—86



Jan. 17—86

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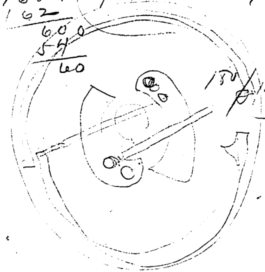
180 / 18000 (100
8' 4"

24
600
187 / 16800 (89.8
162
600
54
60

8,33



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600
180 / 1440,00 (80
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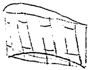
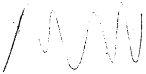
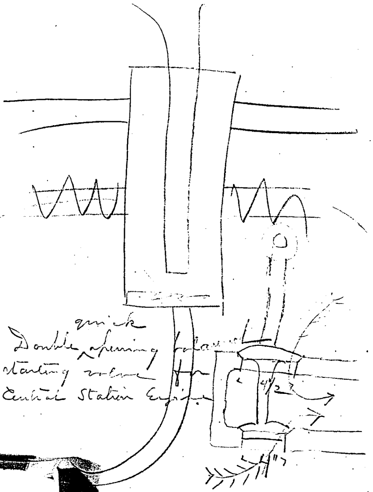




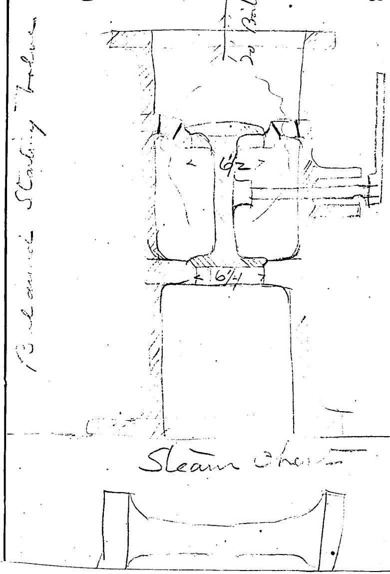
Jan. 17th. 1886

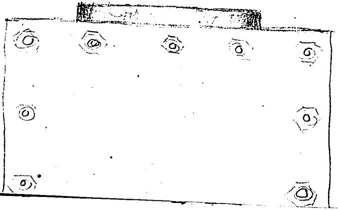


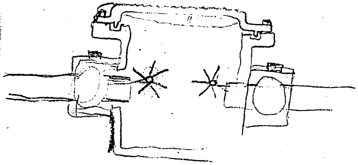
quick
Double opening balanced
starting valve for
Central Station Engine

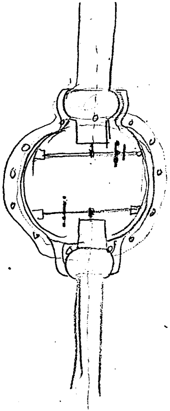
Jan. 17 86

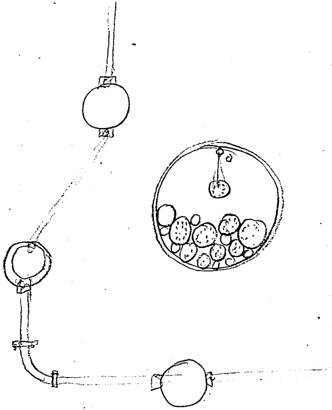
Balanced Starting Valve

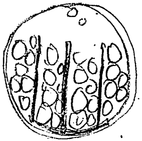


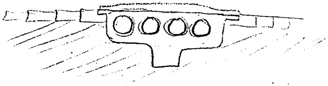






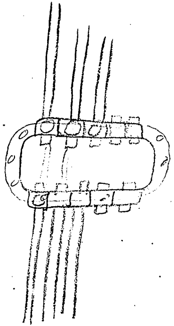






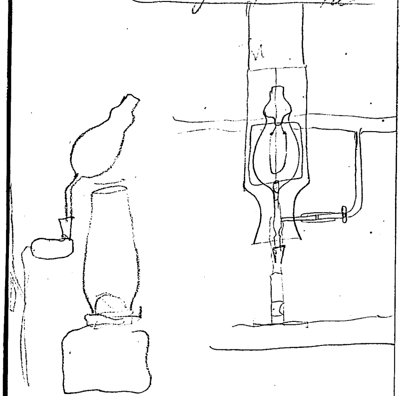
Lorenzo

Lorenzo



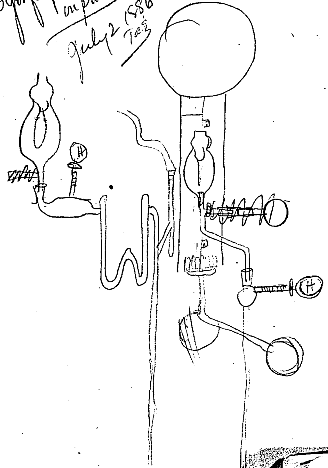
Lamp Experiments July 2 1886

TAE

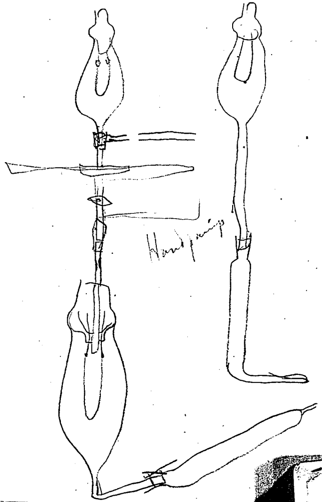


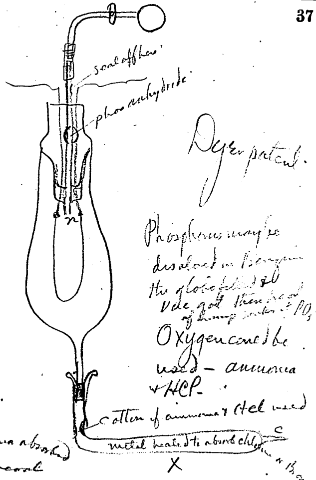
Dyer for patent on process

July 2 1886
TAE



July 2 1886
TAE





Dyer patent.

Phosphorus may be dissolved in Benzine the globe filled & vac got then heat of lamp water & PO_5.

Oxygen could be used — ammonia & HCl.

Ammonia absorbed by charcoal or in sublimate heated giving HCl.

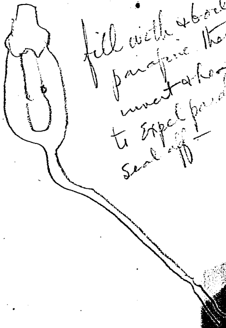
gas passed through X Cold exit c then sealed also n.
The X heated & chlorine absorb

Try pentachloride phosphorus
both to absorb Hg & act as drier
The C combining with Hg & liberating
P which forms PO_3 with O, & of
H_2O.

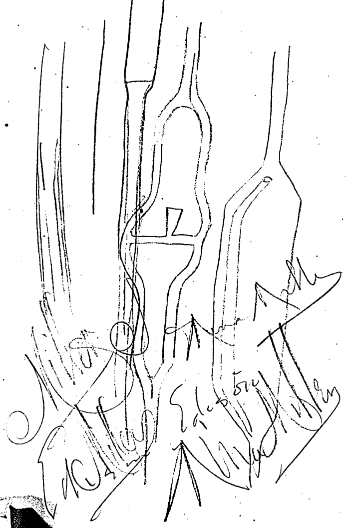
Dipt to Holzer not dissolving out those
lumps that PO_3 jumped up into

Thiosulphite of soda
~~Hyposulphite~~ Soda removes gaseous
Chlorine from substance it ~~has~~ is
absorbed into.

glacial acetic acid
melted paraffine
for pump to replace Mercury
also melted Rose Metal, or
fusible metal



fill with & boil
paraffine then
invert & heat globe
to expel paraffin &
seal off —



Chicago

Chicago Chicago

Florida

Chicago

Wabash

Valley

Pennsylvania

NOW IS THE WINTER OF OUR DISCONTEN
MADE GLORIOUS SUMMER BY THIS
SON OF YORK & ALL THE CLOUDS
THAT LOWERED UPON OURS

Now is the winter of our discontent made
glorious summer by this son of york
and all the clouds that lowered
upon our house are in the deep bosom
of the ocean buried grim visaged war
has s

now is the winter of our discontent
made glorious summer by this
sun of york and all the clouds
that lowred upon our house
are in the deep bosom of
the ocean buried grim
visaged war hath smoothed
his wrinkled front but
now

Lamp Expts July 4 1886
TAE

Bichloride of platinum Combines with Hg — forming I suppose $HgCl$ + amalgam of $PtHg$.

Try anthracene & other HC compounds to absorb Iodine

pentchlorides are I think prone to give off Chlorine — Try these

Try phosphorus, vitrous & Red to absorb Hg —

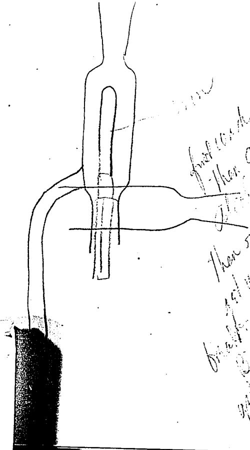
Try pentchloride Antimony for Hg — one atom Cl very loose

oxides Magnesium
mix ~~[illegible]~~ roll out cut filament
also oxide other infusible
dry then soak in Licorice
or sugar or tar, dry then
Carbonize — High Res lamps

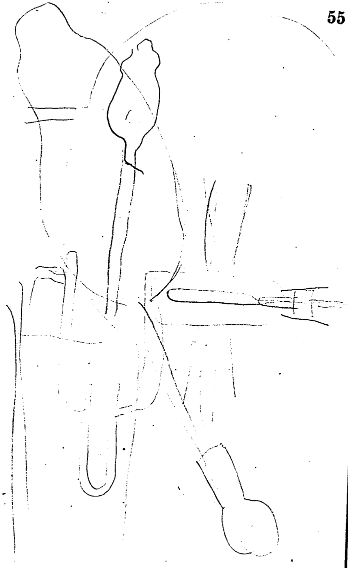
Coating Carbon with Boron
claim decomp Chl Boron
also Fluoride Boron.

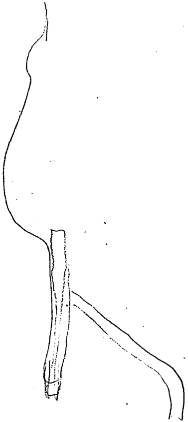
Might mix Licorice, tar sugar or
Dextrine, or Tragacanth with
oxide of Mag etc roll out &
Cut in filaments. Carbonize

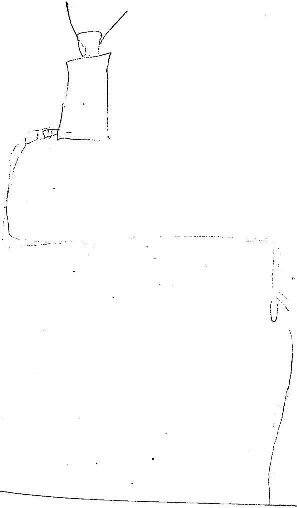
Try iron filament & Chloride Carbon - also in presence of H, also Cynogen gas from Cyanide Mercury or Silver to make filament Disolve out iron

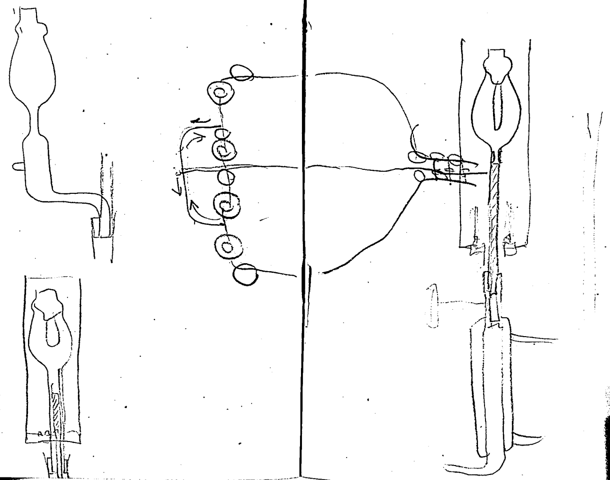


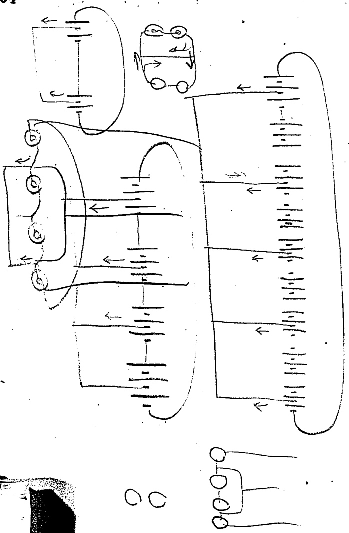
first wash water, then absolute alcohol.
then another pump – get one – finally rinse with Benzol – get elec-heat Lamp & light over fuse.



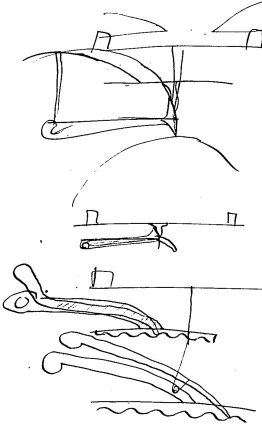


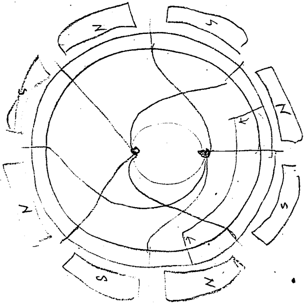






Sept 11 1888 phand




N
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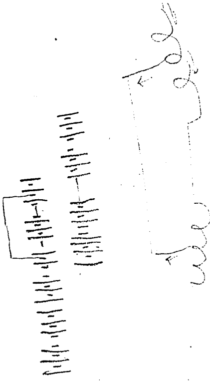
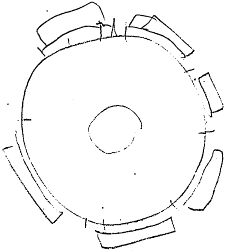
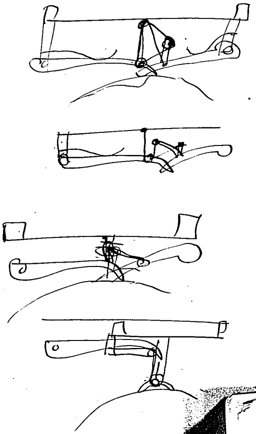
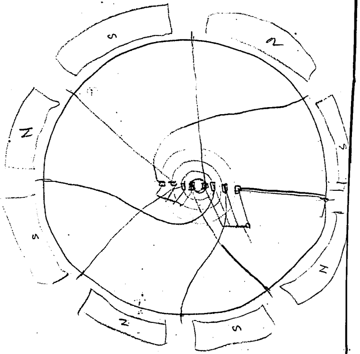




Sept 11 88
Phono




S
N
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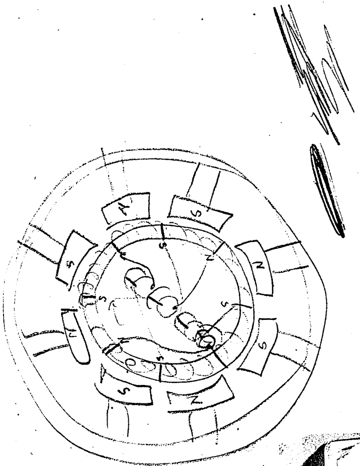
S
S
N
N
S


S
S
N
N
S
S
N
S
N

1.8
900
1620

9 inches —

6.75 — 200 —

18
8.50
144.00

675 —
24
2700
1350
1620

7.50
18
6000
750
13500

18.

675
18
5400
675
12150

130) 466 (3.6

400.

90
3
0

22
3
66.

64) 200 (3.12
192
80
64
160

36.

6.75) 200 (3.

675) 900 (1.3
675
2250

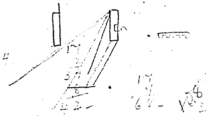
36
3
108

3600
312
7200
3600
10800
112320

9
8.

13 26

64
48



17
68

108

64
4
64

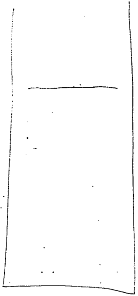
70.8

10800

68
7
476

6.4.

64
160
96
640
960
1024



18
36
6
42

2 X 20

17 20

27
16
43

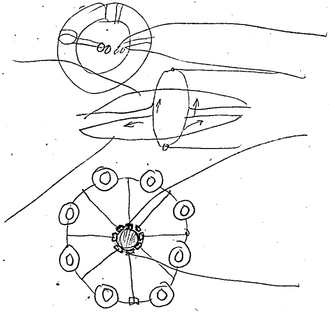
18
3
54.

108

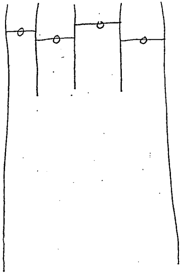
10800

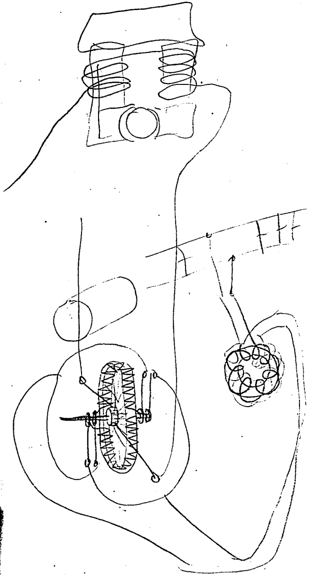
40

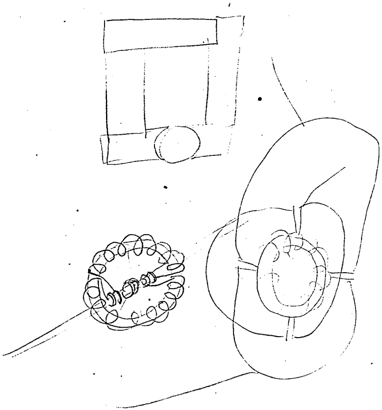
130.

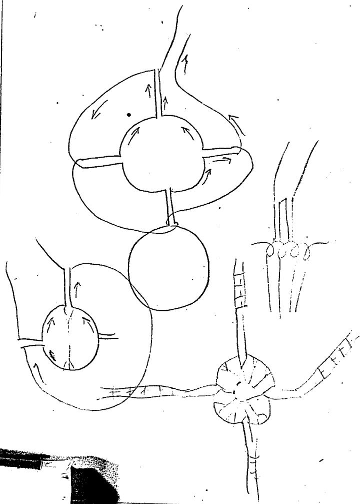


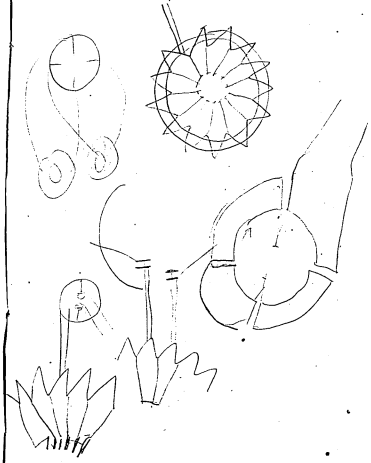
401 60)1900 120 (20 600 1200

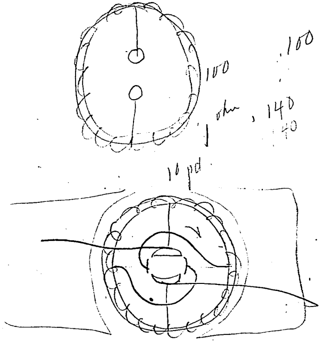


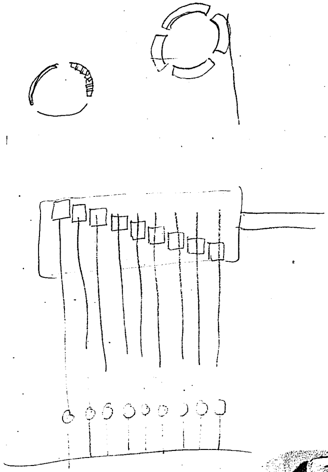


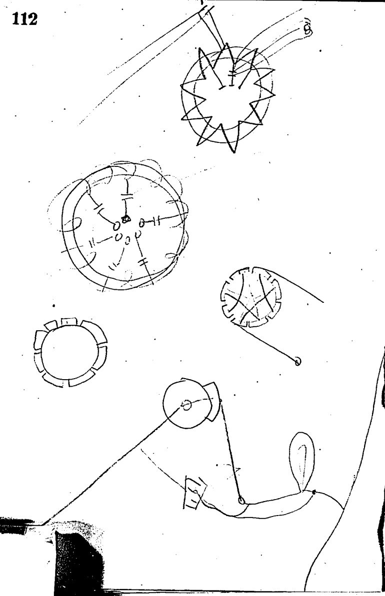







.100
100
ohm , 140
140
10 pd





40 / 33000 (825
320
100
80
200
200
1200 ohm

2

5

10 Volts

10 2 "

12 – 2 16, 20

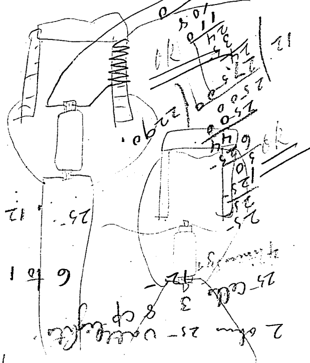
2 ohms 25 volt lights

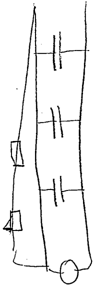
3 8 cp lights

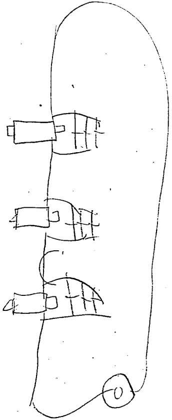
25 cells 12

6 to 1

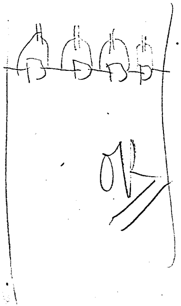
25 12

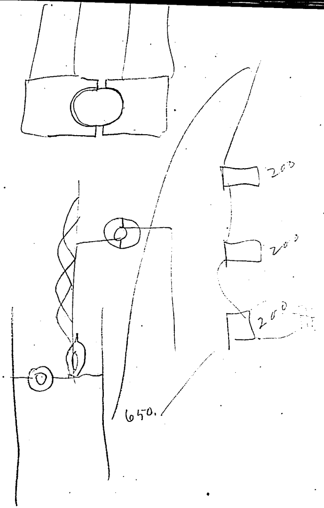




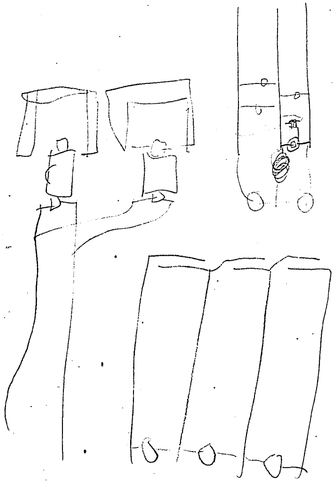


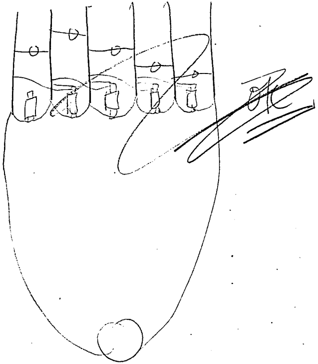
Ok

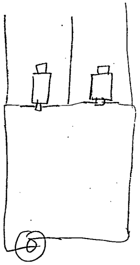


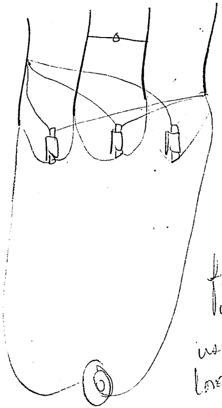

200
200
200
650.


Reverse Current
1000 volts
100 volt Lamp
OK





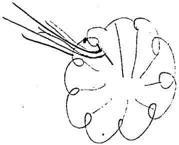




OK

for slowround
low dynamo
use condenser with
long coil

3 or 5 feet,
or large wav
[illegible]



5

3000.

15 20000.

150
30

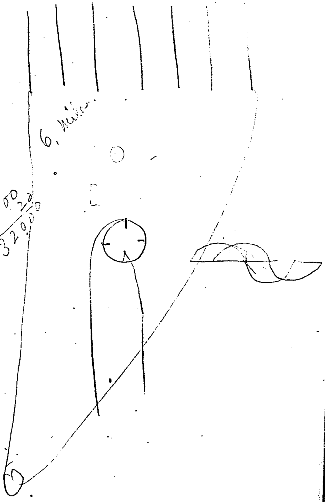
700. 5000

10

3

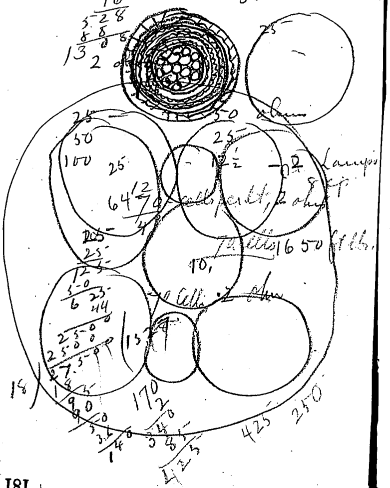
1600
20
32000

3/4 -



88
16
528
88
1308
2

60-
30



170
2
340
85
425

425 250

2000
2000
44 4000000
250. 1000

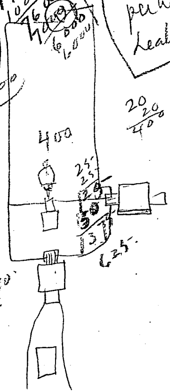
17600000
1000
7600

7. 1500
7
10570 30,000
20
20

17 20.000
340.050
17 01 00
20
150.000

176000
35 hp
per lamp
Leakage

20
20
400



350000

500
20
10000

100000
100,000
20,000
22,000
242,000

45
4
180

750
20
15000

100,000
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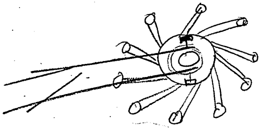
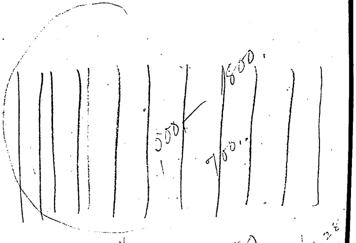
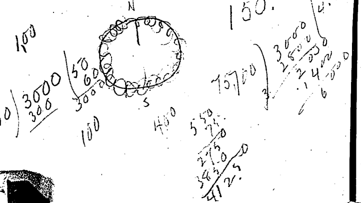
12,000
192000

192000



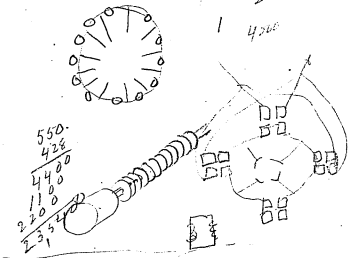


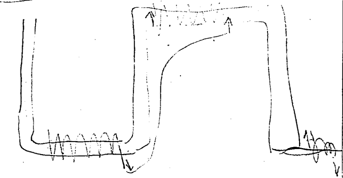


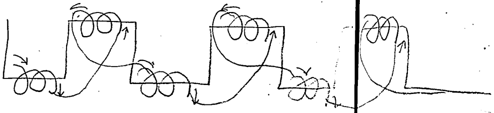
6.

6.

36.



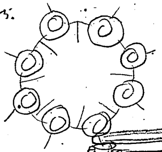


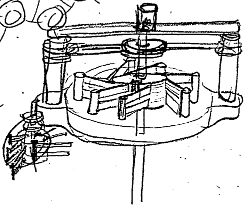


+15
65000
75000

75000

90
47

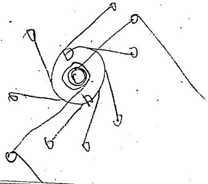


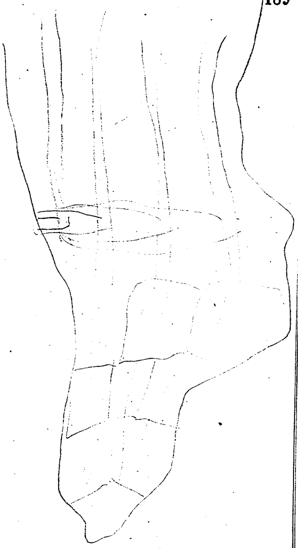


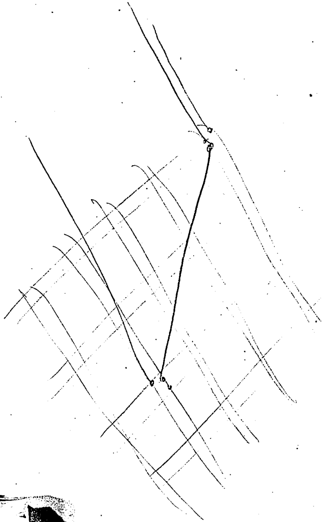
15
80
1200
15
60
900
5000

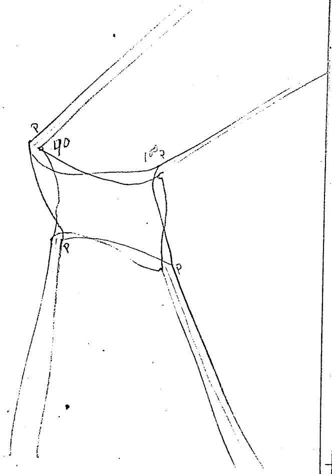
75
15
375
75
1125

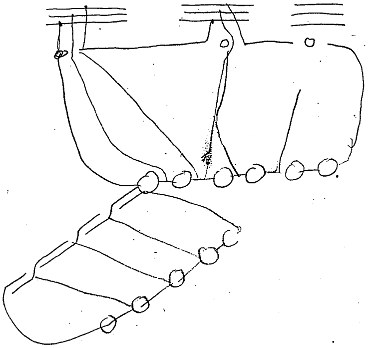
15000
300
4500000
5000
2,500
2
5000

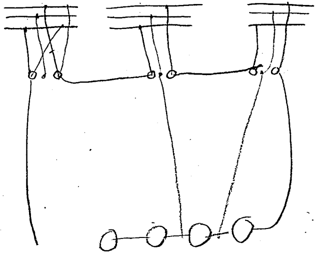


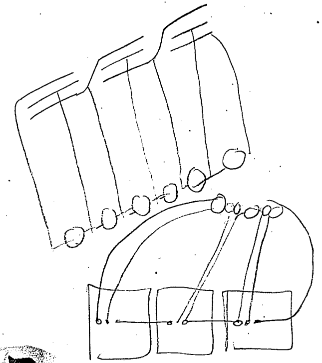


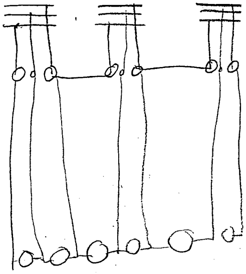


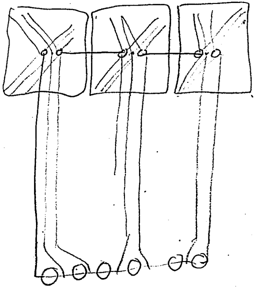




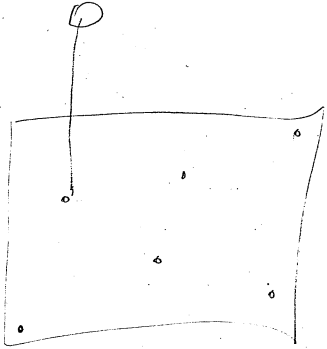


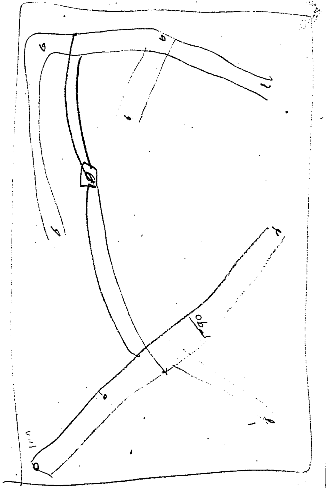


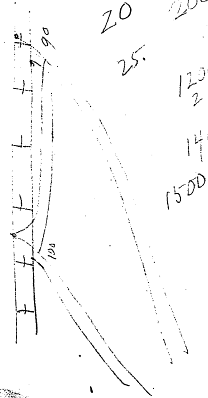




100 000. . . 2 miles 1600.
25 000
6,500







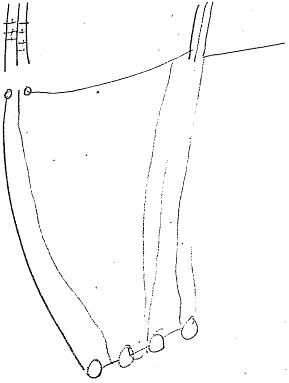
20 200.

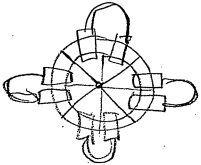
25.

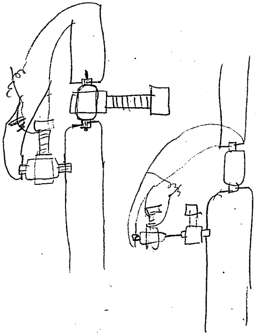
1200
2

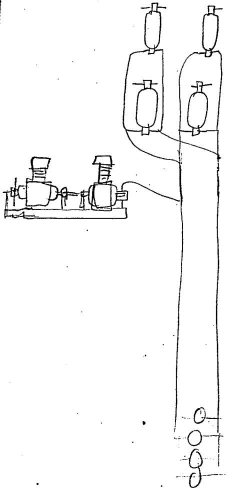
1400

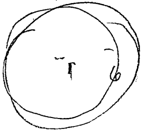
1500,









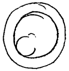


1,56
3000
468000
2
93600
17
655200
93600
1691,1 20

460
230
690,

·6 inch.

2·4

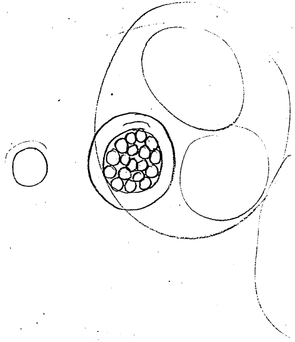


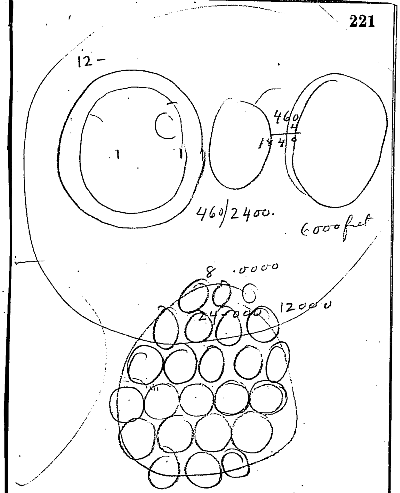
639.
6
3834
17
26838
3834
65178

2.49

567
6
3042
17
21294
3042
5171,14

2400
17
16800
2400
40800

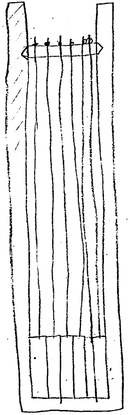


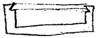


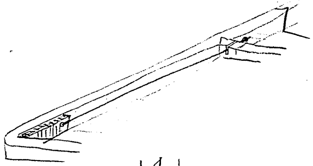
13 108,

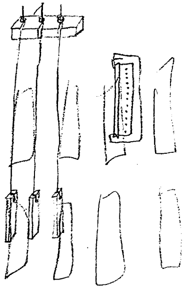
120 - .43

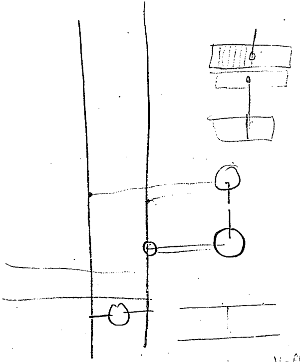
64 - 49
2
98.

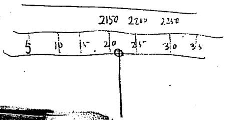




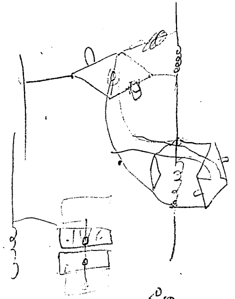








Volt-amp	Volt
~~8~~ 5	2000
10	2050
20	2150
40	2300



300
4000
1200000

7000000

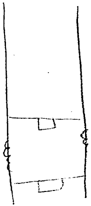
2250

250.

200000
120
4000000

20000
5
100000

16



24000
1000
24000000

2400 -

mills -

3.

35. 3000.

2400

3.50.

150
66

Coal day
1 Coal
1
1 "
1 "
½
2
1

100 3500
3500
3000
1500

6.

20000 8

130

400

15) 20000 (1333

100
44 100
200) 400000 (2200) 33000 (15

3000 -

12000 feet,
5 miles
10 -
20

19,000
7600
304.000
4) 1,216,000
301500

5000
25000
5

300,000. — 16-pct

1300 hp, 20 miles
2600
5200

~~650.000~~
162.000.
32 pct loss 162.000.

20 pct.

4000 hp. 20 miles

160.000 wire,
8000 poles,
15000 underground
175000 dynamos
60000 Reducers
20000 Station Apps

378,000.

16) 1,350,000 (84,370
128
64
60
48
120
112

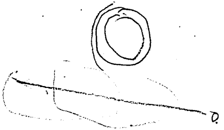
1100
2000 -
400

1300 hp 10 miles — 1,350,
325

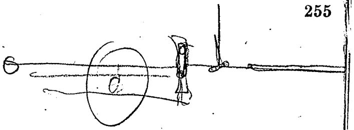
5000) 450000 (90

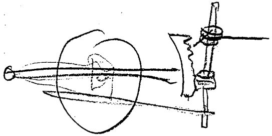
30.
30
5
70.

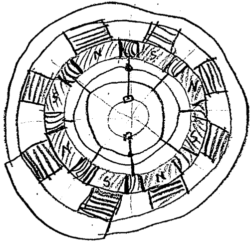
27
5000
135,

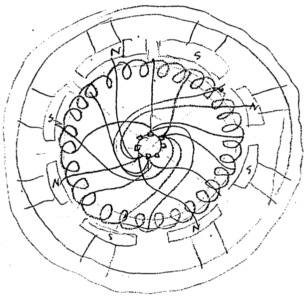


25-






N
S
N
S
N
S
N


N
S
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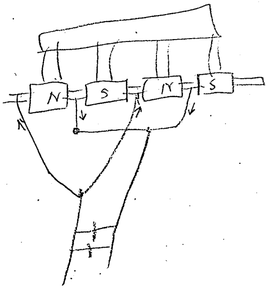
N
S


N
S
N
S

1000 hp ÷

30 - boiler — ~~1 Hp — 6 mills~~
40 Building =
30 Eng.
25 dynamo
10 appliances

Washington Heights 1500
Kinloch
Schenectady
Rifled

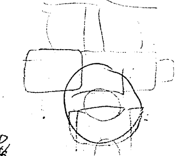
1500 hp) 3500 (2.3
3000
500
450
50

600.
15.
17.
2200.
2500
5000.

Schenectady
Mary
Washington
Schenectady
Dedlow
Phil

50c	hour per hp (day)	10 pct.	5
50	Engine,	10	10
16.8	Dynamo		11.8
.7	Conveyor,		11.87
30	Interest High Tension Cond.		15.00
30.	Manufacturer.		18.

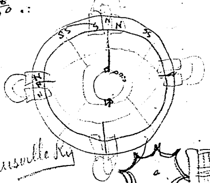
Mina Miller Edison
1700. Mina Miller Edison
Mina Miller Edison
Mrs Mina Miller Edison
Mrs Edison Mrs T A Edison
Edison
Edison Edison
Edison



5

60
3
180

1600
8
12800 ..

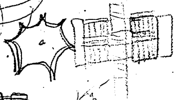


15
30
750

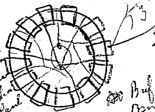
6.75 | 15.
90

Louisville Ky

30



2.5
2000
5000



75

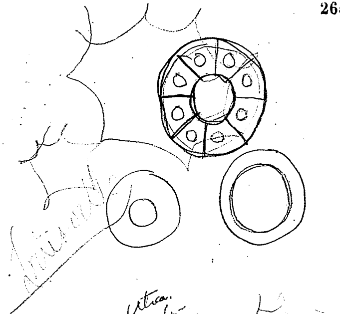
200,

Cin
Dayton
Columbus
Toledo
Cleveland
Wheeling
Louisville.
Nashville
Memphis
Chattn
Atlanta
Mobile
Savannah.
Charleston
Macon

N Orleans
Shreveport
Galveston
Denver
Omaha
St Paul
Mil
Chicago
St Louis
Kansas City
Salt Lake
San Fran
Sacramento
Portland Oreg

Buf
Oswego
Ogdensburg
Troy
Albany
Wmsport
Balt
Phila
Washn

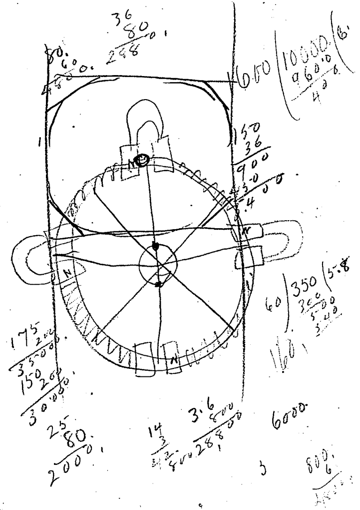
Richmond
Wilmington
Pittsburgh
Scranton.

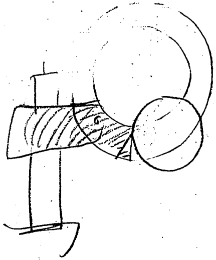


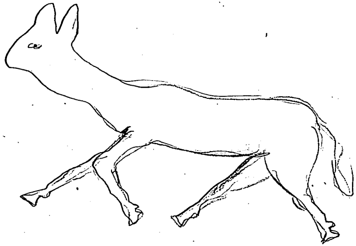
Springfield Mass
Boston
Portland
Toronto
Montreal
Quebec

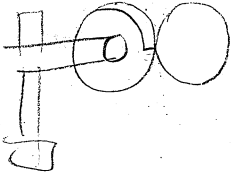
Utica.
Providence
Hartford
Wilkesbarre
Indianapolis
Logansport
Terre Haute
Vincennes
Springfield Ill.

Louisville


36
80
660
10000
150
36
900
N
N
N
60
350
175
150
25
80
2000
14
3.6
6000
800







Morning
Mo
Morni
Mo
Morn

3700 Mo
Lovelace
2400.13.
Morning
55000,
Morning
Morning 8
State
La
Loveland

150,000

1

Sperry Co Chicago

Remington & Sons — Ilion

Mather Electric Light Co —

Sun Light —

Brush Swan Co —

U.S. Co —

Bernstein Co

Thompson & Houston Co

Schuyler Electric Light Co

Sawyer Man Co.

Van DePoele Co Chicago

37
52
74
185
45

45
12
50
45
500

37000
52
74000
185000
1,924000

292

2

1200.

.85. —

200,000

60 —

1000.
900
800 — 6.

N-85-12-06

New York Notebook, N-85-12-08

This notebook covers the periods December 1885 and February 1886. All of the entries are by Edison. The names of John F. Ott and Martin Force appear frequently as witnesses. The first page of the notebook contains a notation by Edison that "this book is to contain ideas as to the discovery of a new mode of motion or energy and also to the conversion of heat directly into electricity." He apparently called this potential new source of energy "XYZ." The one entry from February 1886 relates to carbons for arc lights. The spine is labeled "26." The book contains 288 numbered pages.

Blank pages not filmed: 66-199, 204-288.

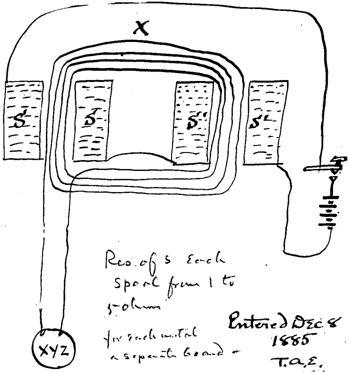
X E-172 N-85-12-08

This book is to contain ideas as to the discovery of a new mode of motion or energy and also to the conversion of heat directly into Electricity

Dec 8 1885

Thos A Edison

12. Boxes 5 x 4 in $\frac{1}{2}$
52 Binding posts



Res. of S each
Spool from 1 to
5 ohms

for each metal
a separate board –

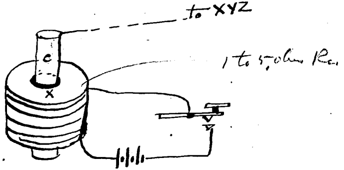
Entered Dec 8
1885
T.A.E.

X all the different metals insulated in form of wire, the Ends connected to every form of XYZ inst made for detecting a new form of energy —

S S' Copper wire spools.

1 Base 4 x 5 = 1/2

4 Binding Posts



c is various metals

x Hardrubber & other bushings

entered Dec 8 1885

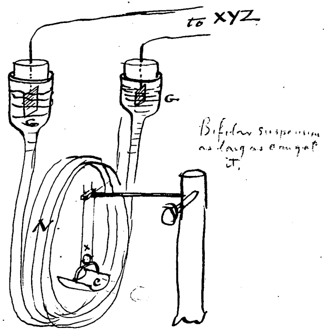
TAE

J. F. Ott

Use etheriscope as an XYZ detector.

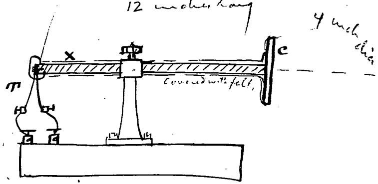
Roll Sulphur with every metal in every solution, Every metal with another in every solution, both insulating and non-insulating fluids.

Entered Dec 8 1885 TaE. J. F. Ott



X a mirror C a pan for laying every Kind of matter,. Bifilar Suspension—
N coil of glass tubing filled with various solutions conducting and non-condctg
G G Electrodes of various materials condctg & non—

Entered Dec 8 1885 G.A.E. J.F. Ott



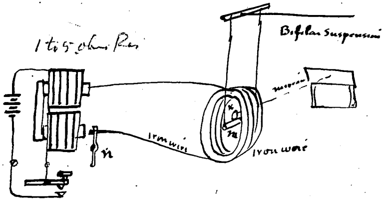
Thermo pile - german Silver & Copper -

Conduction of radiant heat Through hard rubber X is 1/2 stick h rubber one end a thermo couple with mirror gal other end disc rubber; The stick + thermo covered with felt etc prevent conduction to air.

Brass $16 \times 6 = \frac{5}{8}$

Entered Dec 8 1885 TAE J. F. Ott

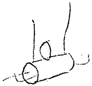
Lead and lead, one plate peroxidized in every solution, Ditto Zinc & Carbon also peroxidized by Manganeese in every solution,



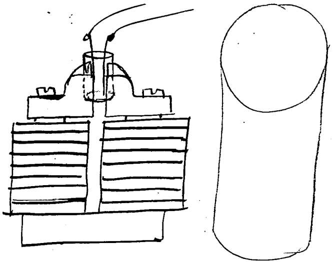
n for making and bkg contact with iron core.

m cores of all materials,

Brown 10 × 5 = $\frac{5}{8}$



Entered Dec 8 1885 TAE. J. F. Ott

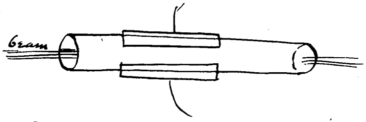


Try all the metals in and out of a magnetic field, also open and close the magnetic field to get an independent effect ——————

Base 8 X 10 = 1 in

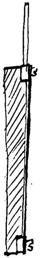
Entered Dec 8 1885. J. F. Ott

Passing a beam of heat or light through a liquid causes absorption of energy, hence devise conditions, that instead of heat, it goes to conductors,



glass ends, Rubber tube, also jointed metallic tubes, also glass tubes wire sealed in side and tube blackened, Fill tubes various Liquids

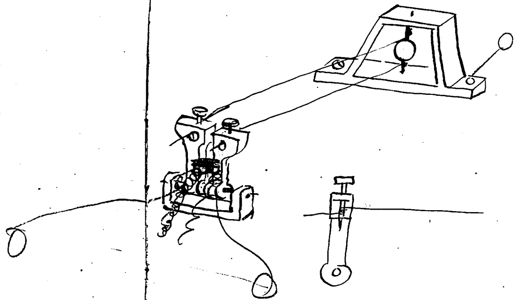
Entered Dec 8 1885 J.A.E



Hard rubber disc 1/16
narrow chamber filled
with liquid, small specific
heat, index tube, of glass
Heat thrown on disc moves
Column liquid ——

Base $5 \times 4 = \frac{1}{2}$

Entered Dec 8 1885 TaE J. F. Ott



Expansion mirror indicator.

Entered Dec 8 1885 - TAE

J. F. Ott

Solutions, (ie) disolving substances
Liberate or absorb heat, hence use
all solutions with all metals
and disolve various Things in
the solutions

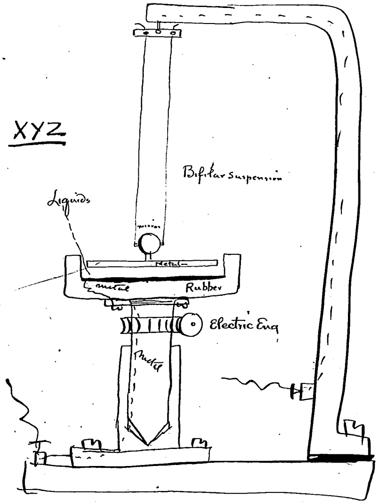
gold plated

Entered Dec 8 1885 T.A.E.

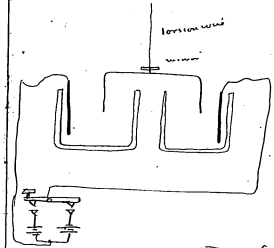
J.F.O.

Base 6 × 8 = 5/8

XYZ



Entered Dec 8 1885 — J.a.E.



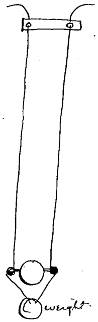
Different Liquids

Platina Electrodes

Entered Dec 8 1885 TAE.

XYZ

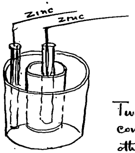
$5 \times 6 = \frac{1}{2}$



Cord moistened ~~with various~~ solutions, also animal strings -

Entered Dec 8 1885 J.A.E.

J. F. Ott



Two different liquids which combine (ie) acid & alkali; also other liquids with react on each other + exchange places

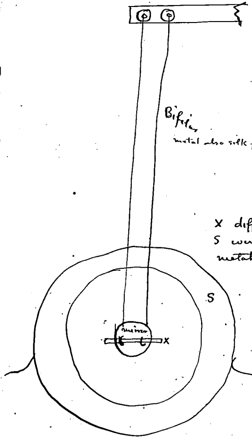
Act of re-combinations gives energy hence try all solutions and all metals with every XYZ indicating instrument;

Box 5 x 6 $\frac{1}{2}$

Entered Dec 8 1885 T.A.E.

J. F. Ott

All connection wires same material as spool is wound with —



XYZ

~~Indicator~~.

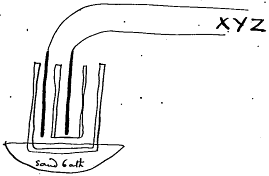
metal also silk fibre.

X different substances
S wire of different metals

spools of every dif metal [illegible]

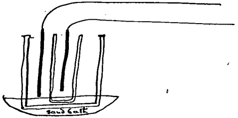
Dec 8 1885 Entered TAE — J. F. Ott

Get Tyndals work on Thermics — make Light and heat filters.



Carbon & Carbon — also various metals like and unlike — water in one & Ethylic Iodide (ie) best & poorest conductor heat.

Entered Dec 8 1885 T.A.E.
J. F. Ott



One part of cell water acidulated porous cell, good conducting liquid having lowest specific heat, hence by heating the water will for long time, on account of its high specific heat be the coolist & we should get a big thermo Current

Carbon Electrodes to be used, Cooling gives also a Current

Entered Dec 8 1885 = TAE J. F. Ott

Best method of ascertaing new source of energy without use of unknown indicating apparatus is to. take for instance plate of Zinc and a plate of every Known other substance, and immerse these in Every Kind of Liquid, first carefully weighing Each plate, then short circuit them and leave them in the liquid for one month or less, if there has been any action due to association the scales will show — a pair not connected (ie) short cktd should be put in the same solution,

Suppose we take Zinc as one plate and Hard rubber, Sulphur, Lead tin Zinc + all the metals, Carbon Sulphides, phosphides Selenides arsenides, wood glass, glue, Dextrin, Slate, Gutta Percha

J. F. Ott

mica, peroxides, paper, moulded sticks of various material, parafine, Rosin, asphaltum, moulded oxides,

Place these in solutions of salts where galvanometer shows no Electricity -

use, Bisulphide Carbon, Benzine, Carbolic acid, + kindred solutions,

Then substitute for the Zinc some other material + so on this will require several thousand Experiments, Entered Dec 8 1885 — TAE

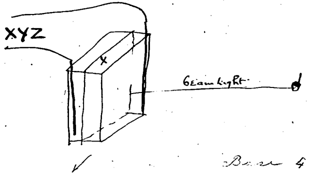
Supposing the Conducting wire of a submarine Cable was coated $\frac{1}{32}$ of an inch thick with a Selenide, phosphide or amorphous phos that was a true Conductor but very high, so the resistance between the wire for one mile of cable if the exterior was Coated with copper over the selenide was 500 ohms would not the Electrostatic capacity of the Cable be Enormously reduced when the diaelectric was in contact with the Selenide, It would have to Charge the diaelectric through a high resistance, Entered Dec 8 1885 J. F. Ott

It seems to me if an instrument such as an Electromotograph Mirror 'inst) was used on the Cable and a battery of iron + copper in water or even less Electromotive force that the Cable would not be charged in signalling as the dialectric is already charged to the potential of Copper + iron, it is in fact a single cell of Copper and iron, the dialectric being charged accordingly consequently if you signal with an Emf Equal to this it shouldnt charge the Cable— I have constructed a condenser of iron + Copper + the charge if different according to the direction of the Current,

This explains the discrepancy noticed
by Cable Electrician between the
P & N charging current.

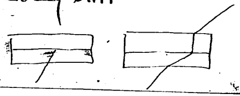
Entered Dec 10 1885 TAE

J. F. Ott



Base 4 x 5 ½

glass cell. X transparent porous septum say parchmentized paper Each liquid has different refrangibility. passing beam concentrated arc light rapidly across cell make XYZ may be standing stiff

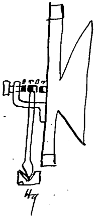


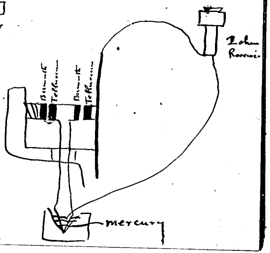
Entered Dec 10 1885 TAE
J. F. Ott

Proposition, iron alters magnetism by heat, nickel more so; hence surround iron core by wire, balance in bridge + use current to magnetize core, then by a beam or hot copper bar heat end iron core suddenly = if we get a jump on the mirror, ~~we~~ ok = In practice hot + cold water could alternately be passed through Steel magnets covered with Coils + with Commutators get a Constant Current.

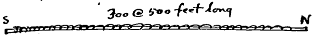
Entered Dec 10 1885 TAE J F Ott

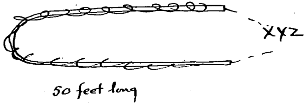
Thermic reverser phone.





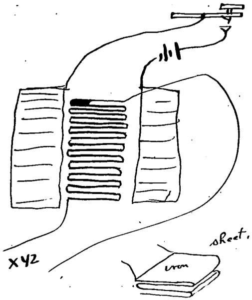
Entered Dec 10 1885 TAE J. F. Ott





No 4 Iron wire wound uniformly with say 22 wire - & the iron wire magnetized -

Entered Dec 10 1885 TAE
J F O[illegible]



Carbon for arc Light = Experiments

Feby 17 1886 — ~~J F Ott~~ M. N. Force

Liccorice disolved in water is to be used in every proportion, It is to be mixed thinly with the different Carbon powders put in the mixer + the mixer heated up to 220 to 250 to drive off all the water you can continue this for different times until the licorice is solid + will just bind the Carbon together in the press —

Make samples of every kind of proportion of Lampblack — with hard Carbon also with the petroleum Carbon also Lampblack alone — also hard Carbon alone also petroleum Carbon alone ———

The do ~~this~~ all the Experiments over again using Coal tar as a base instead of Liccorice

11673
10767
906

10517
250
10767

~~32~~09
3592
1000
312
74
300
2000
30
10517
2030
8487

The do them all again with Sugar as a base, J. F. ~~Ott~~ MNKF

also with Wood Tar as a base;

also with Copal varnish as a base;

O

also take some of the unburnt petroleum Carbon powder & without mixing anything with it press it ~~Hot &~~ squeeze it hot, It softens —

also try Experiment after all the different Carbons have been more fully Carbonized at the Lamp factory and after burning a couple to get their burning time to rig up a place in Laboratory where you can bring up a mould just to a dull red or little below —
Then take one or two of the remaining Carbons of that batch & soak in Licorice water, heating the Carbon to 2 or 300 on sand bath before plunging in Licorice syrup — then after it has remained in for 2 or 3 hours take out put in mould & bring gradually to 8 or 900 fahr — then take it out again resoak & recarbonize See how many times you have to do this to get 12 hours burning

also try soaking in sugar syrup
also in thick Coal tar, also
pitch -

Hard Rubber. sealing wax
Vulcanized Fibre
Celluloid
Mica
Glass.
Woods.
Letheroid.
Plates of gums,
Parchment paper pasteboard,
Pasteboard,
Pasteboard japanned
Hard Calendered pasteboard Manilla,
Ivory.
Bone,
Horn,
glue
glue & wood etc mixed,
Amber
Porcelain
Earthenware.
Plaster Paris soaked parafine & Liquid insulators
Marble
Slate.

Insulators Soft.

Soft rubber
Balata,
Celluloid as collodion,
Vulcanized fibre glycerined
Leather parafined or gummed.
Gutta percha;
Vulcanized Bitumen & Asphaltum;
Oxidized Linseed oil
Copal gums softened,
Asbestos paper

New York Notebook, N-86-04-28

This notebook covers the period April-May 1886. All of the entries are by Edison except for one set of notes and drawings by John F. Ott relating to carbon filament experiments. Most of Edison's notes concern fundamental magnetism experiments, including the determination of the Earth's magnetism and the lines of force of the various planets around the sun. Other notes and drawings deal with quadruplex telegraphy, the phonoplex, telephones, and dynamos. Included also are a set of notes by Edison labeled "Reasons against an Alternate Current Converter System" and some calculations regarding the cost of flowers and other plantings for Edison's property at Fort Myers. The first page of the book is stamped "Laboratory of T. A. Edison, 292 Avenue B cor. 17th St." There are 294 numbered pages. At least one page at the end of the book has been torn out.

Blank pages not filmed: 8-9, 122-125, 266, 269.

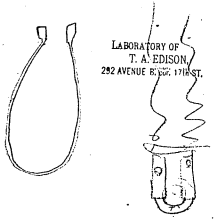
Missing pages: 267-268, 271-272.

N-86-04-28

N-86-04-28 1

Laboratory Notes

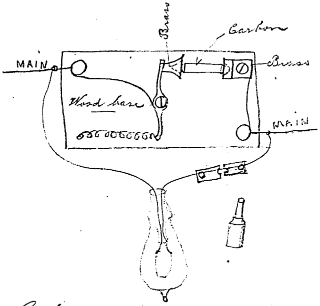
410/014. April. 28. 86.



April 28 86

~~J. F. Ott~~

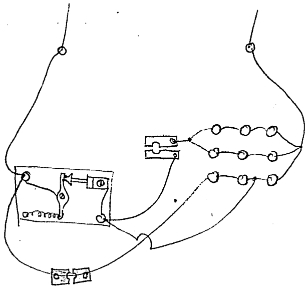
Made Nonfusible cutout



Cut small strips of Charcoal
" strips of Card board
Carbonized at Lamp Factory

Made following conections on 100 Volt circuit.

J. F. Ott

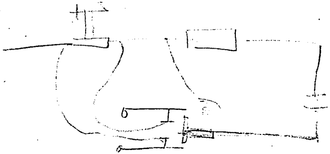


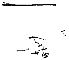
Wood carbon to high resistance to work on 100 Volt circuit, better be tested on 1000 Volts

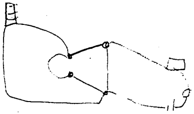
Paper Carbon was low enough came to red heat but wasted away in open air

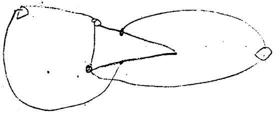
April 28, 86

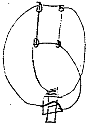
Made strips of wood and
paper coted with
Plumbago mixed in
gum Sandarch,, This I
found when made small
enough in section ~~that~~
two Ampers current heated
it, or caused it ~~to~~ undergo
a change it would waste
away entirely,

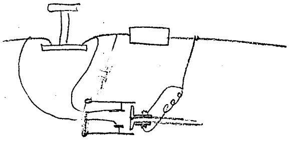


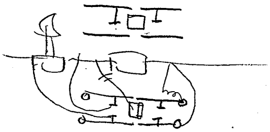


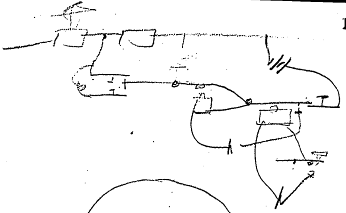


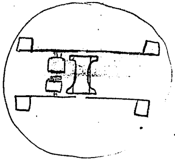






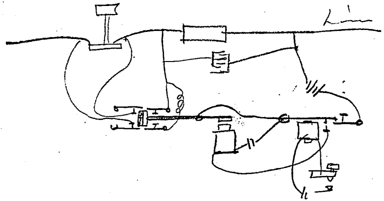


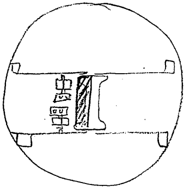




May 8 1886 TAE

Phonoplex





520 000,
100 000 000
52,000,000,000,000

100,

17

1/8

96 foot
520000

52,000,000,000

880 000.
3
2,640,000,000,000,000

1/12

52,000 000 000 / 2640,000 000 000 (50
260
400

52 000 000 000 50
2600000000000

$\frac{1}{12}$ ohm 100 000 wide
~~foot~~ deep
14 mile deep $\frac{1}{\text{millionth}}$ of ohm

2 - $\frac{1}{24}$
4
8
$\frac{1}{100}$

2640 000 000 000 50
132,000,000,000,000

14/ 200,000 (14285
14
60
56
40
28
120
112
80

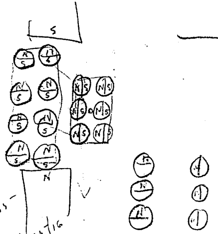
16 - 1200
32 400
64 80
75 $\frac{1}{1000}$
150 $\frac{1}{2000}$
300 4
600 8
1200 16
2400 32
4

2
4
4
14 . $\frac{1}{m}$

25

$\frac{1}{75000}$ per mile.

14285 000,000
1428500000 44
5714000000
5714000000
628540000000



12)365 (30.5
36
50

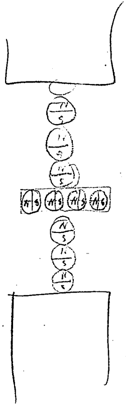
10)365 (16

4)365
91

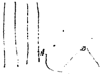
19,046,666,000,000

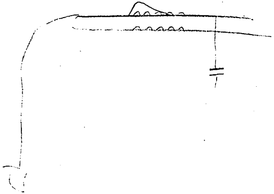
33000 / 628,540,000,000 (19,046,666
33 000
298540
297000
154000
132000
220000
198000
220000
198000
220000
198000
220000

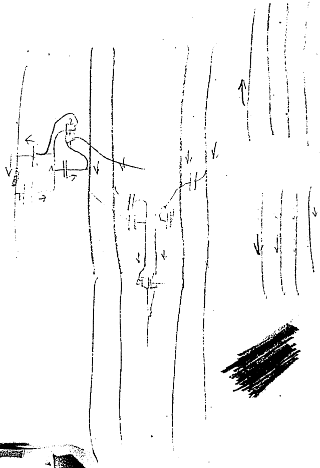
19046666
33000
57139998000
57139998
628539978000

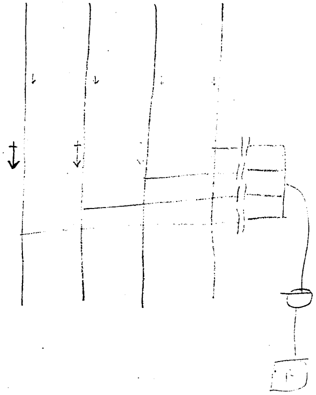


The induction of a coil in a glass globe of Oxygen should be greater than in other

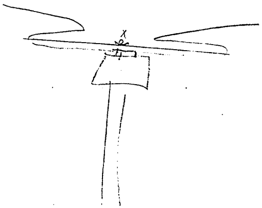








May 8 1886 [illegible]



Telephone Receiver, very
small ball which will be
thrown up by slight vibration
amplify sound

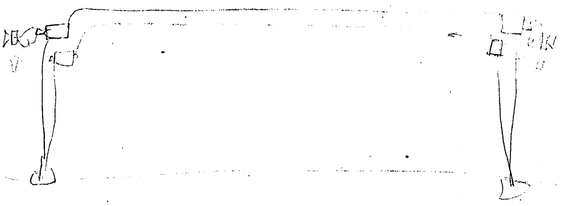
12.

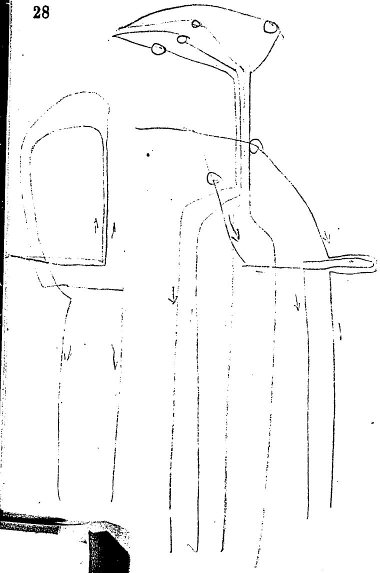
90

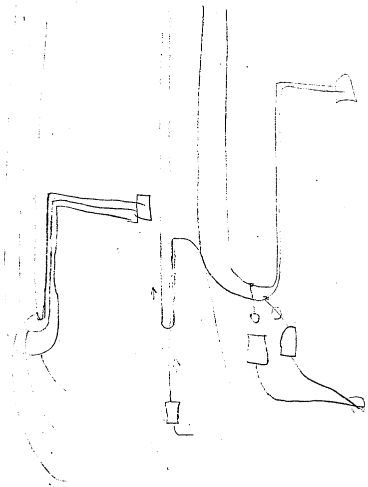
572.50
1.00
572 50.00

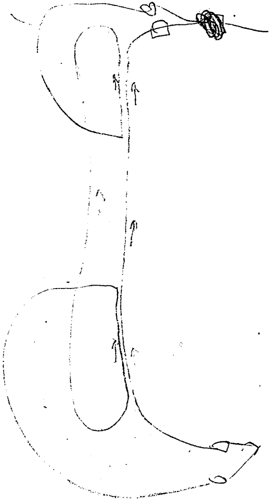
262,000 —	6
131,000 —	3
65,500	1½
32,750 —	6/4
16,382. —	3/8
8,150 —	3/16
4,075	3/32
2,000 —	3/64
1,000. —	
500	5
250.	

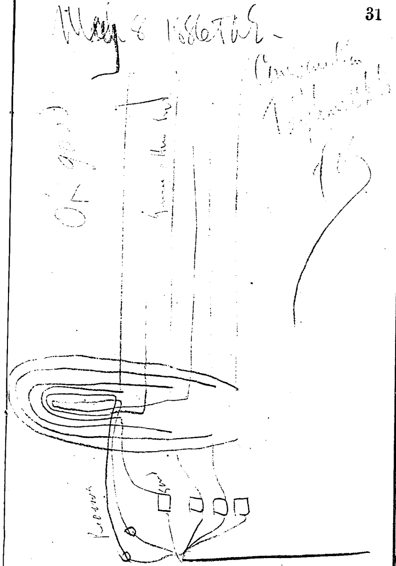
6

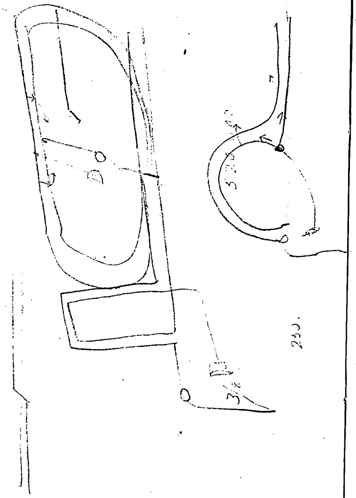


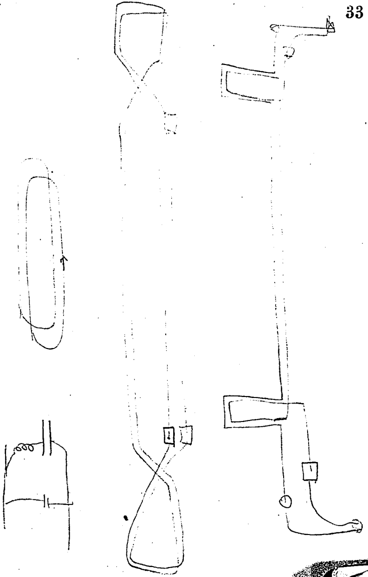


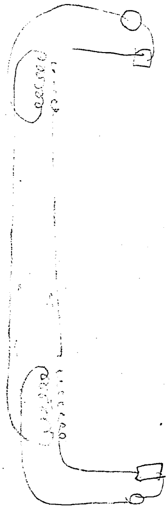


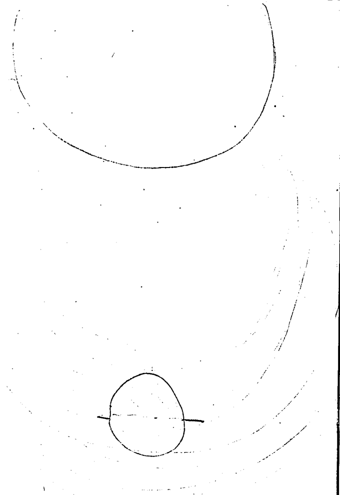


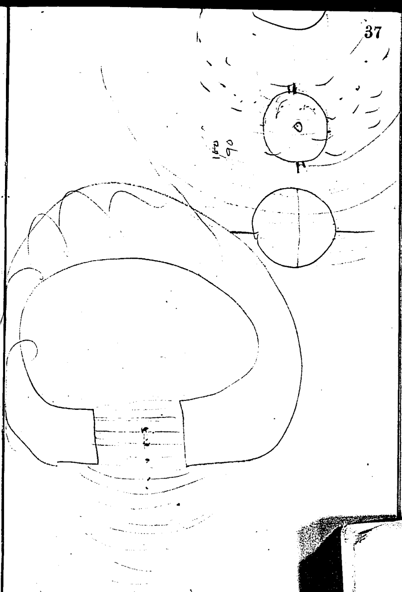


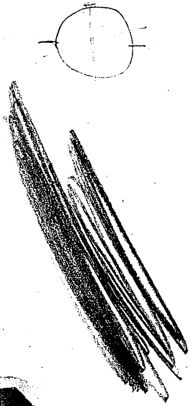


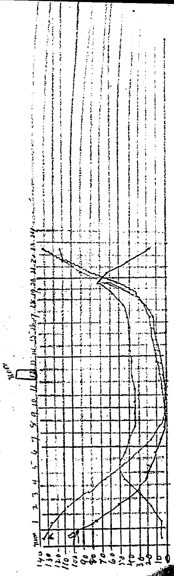








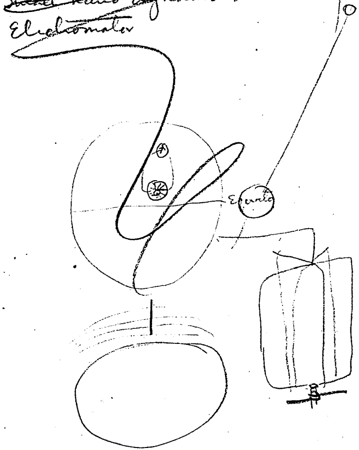


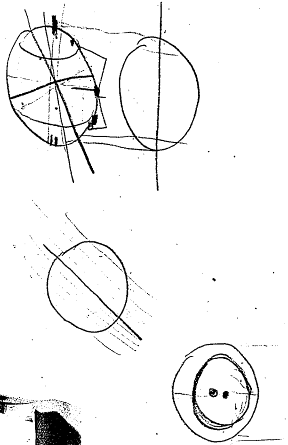


A St Helena
B Singapore

May 9. 1886 TAE

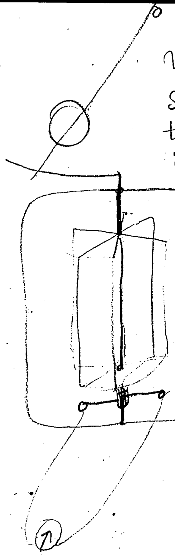
~~Small hand dynamo driven by~~ Electromotor





May 9 1886

Simple dynamos
to determine
Earths Magnetism

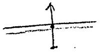


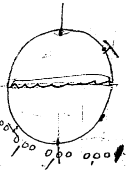
use pendulum
& motor..

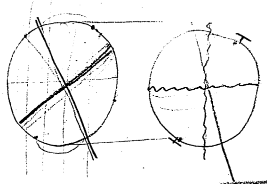
20
6
120

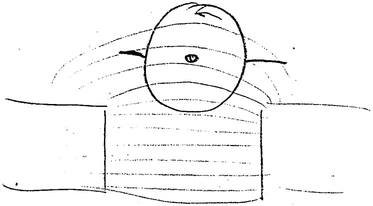
33000) 8,464 000 000 000 000 000 000 (2,564,840 000 000 000
66000
186400
165000
214000
198000
160000
132000
280000
264000
160000
132000
0

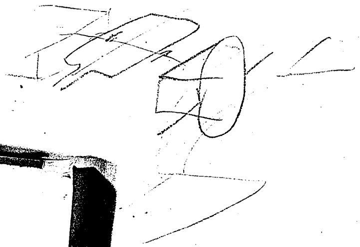
2564840 000 000 000

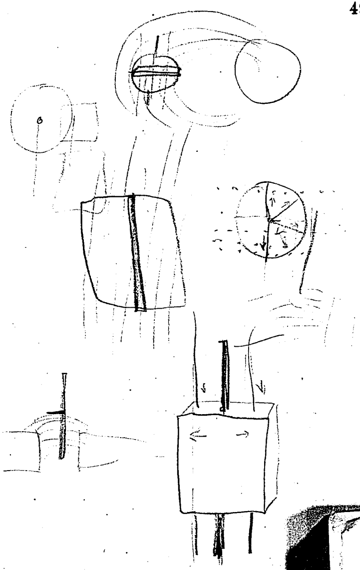


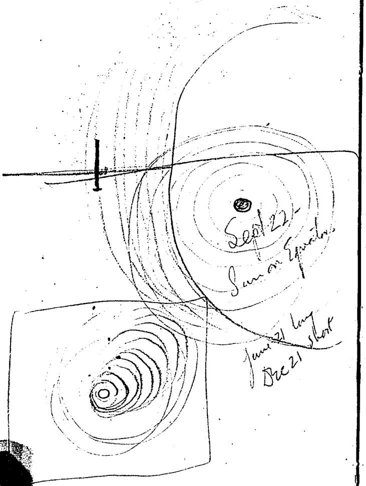


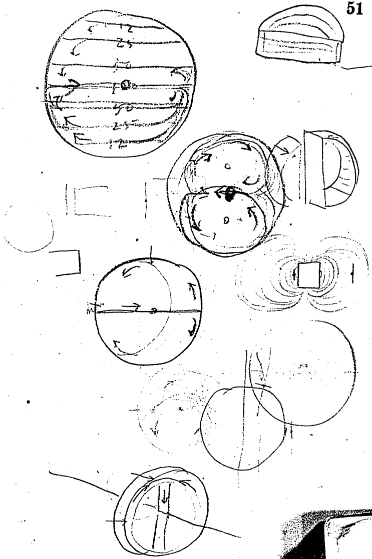









Sept 22
Sun on Equator
June 21 long
Dec 21 short



16.66 2/3 16.66 2/3
525 3 5250 3
7875

5250
2625
3
7875

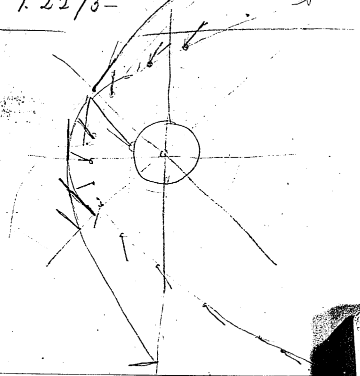
8330
3332
8380

7875) 875 4.375 (14.58
60) 60
275
240
354
300
543
540
3

4) 5.000
1.250
1.2275
4
4.9000

15
15
75
15
220) 1459.0 (6.
1350
109

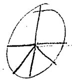
Equal to its weight multiplied by the number of feet in the radius of the circle and this product by the square of the number of revolutions per second. and this multiplied by 1.2275



10 lbs. - 5 ft. - 15 revolutions

10
5
50

15
15
75
15
225
50
11250
1.2275
5625 0
7870 0
22500.
22500
1 2250
138093250



1.2275
50
61.3750
225
3.068750
122750 0
1227500
13809.375.0

10
5
50

225
50
11250
1.2275
5625 0
7875 0
225 00
22500
11250
13809.375 0

1.2275
10
12.2750
5
61.3750.
225
3068750
1227500
1227500
13809.3750

1.2275
10
12.2750
5
61.3750
225
3068750
1227500
1227500
13809.3750

15
75
15
225

8000m. - 4000m.

1 lb. rel - 1

4000
1.2275
20000
28000
8000
8000
4000
4910.0000 lbs. 2.45.50

2000 4910.0000
40
91
80
110
100
100
100

100 245.00 2.455 Tons
200
455
400
550
500
50

854000 d -
427000

427000
1,2275
2135000
2989000
854000
854000
427000
20)5131420.000 (256571.125 (25.571

427000
133.864
1708000
2562000
3416000
1281000
1281000
427000
20)57159938.000 (2857996

1-da

24)1.00000(.4166
96
40
24
160
144
160

60).4166 (7
360
766

60).41666 (.69444 (.11574

.1157
1157
8099
5785
2314
1157
133.8649

28579

24/1.00

25/1.000 .03
75
250

25/1.00 .04
100

24/.040000 .001666
24
160
144
160
144
160

60/.0016660 .0000277 6
120
466
420
460
420
400
360

60/.00002776 .000000492
240
376
360
160
120
40

427 000 radius.
1 lb.

1 rev. 25 da.

.000000 492 rev. per sec.
.000000 492
~~0000000~~ 984
~~0000004608~~
~~00000~~ 04428
~~00000~~ 01968
.0003 ~~00000000~~ 242064
~~427~~ 427 000
~~00~~ 000000 1694428 000
484128
968256
.000000 103361308 ~~000~~
1,2275
516806540
723529156
206722616
206722616
103361308
.00000 012687600557 ~~00~~

450 ft sec. 10 lbs.

864000 di-
3
62000

5250 ft

5200
4000 hr - mi

454)21,000,000 ft = 46,666.66 2/3
1800
3000
2700
3000
2700
3000
2700

45000
1.2275
225000
210000
0000

20)1000000 126876 1000000 6343 $\frac{?}{8}$
120
68
60
87
80
76
60
160

1??)1000000 63438 1000000 6343 $\frac{?}{8}$
600
343
300
438
400
380
380

450
10
4500
5
22500
1.2275
112500
157500
45000
45000
22500
27618.7500

13,873
2
27746

10 lbs - 5 ft = 15

225
100
22500
1,2275
112500
13750 0
45000
45000
22500
77,618.7500

1,2275
10
12.2750
10
122.7500
~~1.2275~~

122.75
225
61375
24550
24550
27,618.75
2 1/2
13809375
5523750
79,04687 5

450
2 1/2
225
900
1125

27,618.75
2 1/2
13 809375
5523750

425 000

1.2275
10
12275.0
10
122.75.00
225
6137500
2455000
2454500
27,613.7500 lbs

~~24~~5 000 mi - india -
1 lb.
15 rev per sec.

1.2275
245 000
61375000
49100
24550
300737.0
225
15036875
6014750
6014750
180 | 67665937.5 | 67665937.5
600
766
700
665
600
659
600
593
500
937
900
375
3700
7

20 | 676659.375 | 33832 7/8
60
76
60
165
160
59
40
193
180
137
120
175

$\frac{c}{2\pi r} = \pi$

radius - 6 ft.

$$\frac{4 \times 3^2}{32.16} = \frac{4 \times 9}{32.16} = \frac{36}{32.16}$$

36.000) 1.11
3216
3840
3216
6240
3216
4

$$c = \frac{w(2\pi s n)^2}{sg} = \frac{4\pi^2}{g} w.s.n^2 =$$

$$\frac{4\pi^2}{32.16}$$

450 sec
60
27000
60
5250) 1620000.0 (308.5
15750
45000
42000
30000
26250
50

225
50
11250
1.2275
56250
78750
22500
22500
11250
1388937.50

15
15
75
15

4000 mi dia.
8
32000
40
1280000 rd.
5½
~~64000~~
6400000
7040000
3
21120000 ft. radius.

20)176.6068(08830
160
166
160
60
60
6

1 = 1 - 24 hrs.
60
1440
60
86400 sec.

.0883 7 min

1 - 60)24.0 60)1.400 (.0066
24.0 120
40

60)1.000 60).0166 (.0002
60 120 .0002
400 46
360 00189
40 00054

.000000729

21120000
.000000729
190080000
42240000
147840000
14396480000

14.39648
1.2272
7198240
1007
2879296
2879296
[illegible]
1766[illegible]899200

225
50
1125
1225
50
750
750
750
1125
3125
1125
1380
60
60
120
32
24
360
384
31

10
5
50

15
15
75
15
225

15
60

375

3216

5) 11,250

10

1

30) 11250 (375

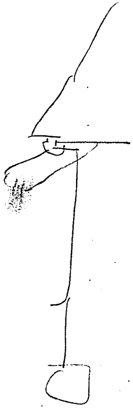
1236

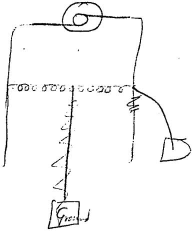
Quad. 375 Volts.

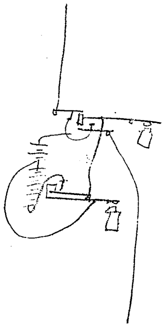
4

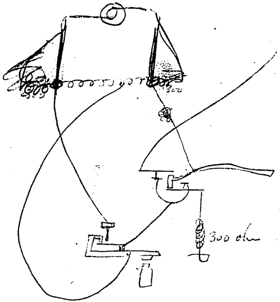
380.

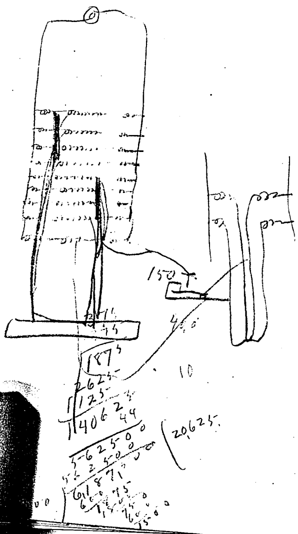
37

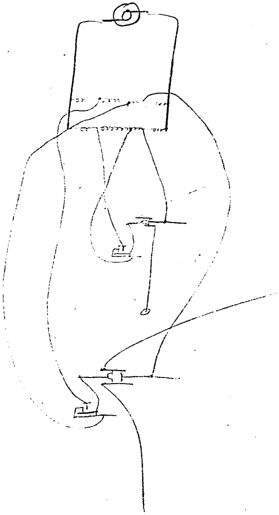


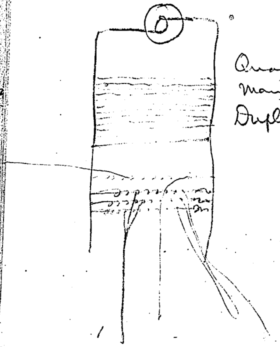


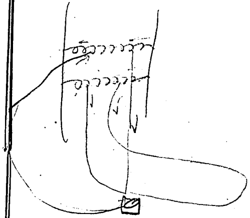



300 ohm


150 T
10
20625




Quad
main
Duplex



1440 feet Sec

60) 86660 (1440
60
266
240
266
240

60
864000

1000 hours
5000
5000000

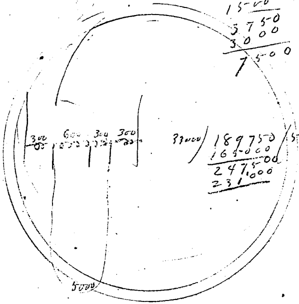
60) 520,000 (86660
480
400
360
400
360

60
519960

350 volts

4125
46
24750
16500
189750

1500) 6,187,500 (4125
6 000
1875
1500
3750
3000
7500



33000) 189750 (5.7
165000
247500
231000

240000
5000
120,000,000

1

1200000000) 133225000 (0011
120000000
13,225000

$\frac{1}{333}$

400) 133,225000 (003
120000000
13225000

8000
5000
40,000,000

$\frac{1}{289}$

.003

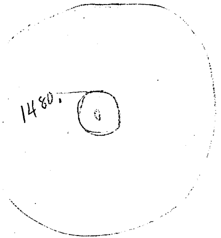
1.02

365
365
1825
2190
1095
133,225

4.01) 146600 (365.5
1203
2630
2406
2240
2005
2350

10) 133725 | 13,322

15
30
215

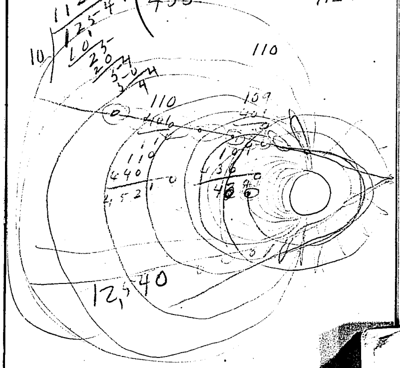


112.
112
224
112
112
10) 125.44 | 12,544
450

4.01) 45.00 | 1010
401
490
401
89

112.6

110



4023 second

seconds/day 86400) 347607.750 (feet daily in total 4023 -

345600

66211

24) 1589041 (66211 - hourly

86400

1589041 orbit

401) 4023.00 (10.0

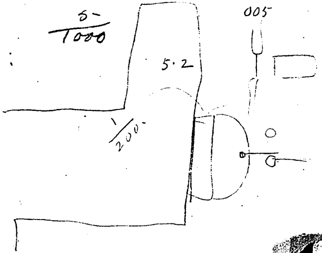
401

1 300

190,000) 1.000.000.000 (5.22

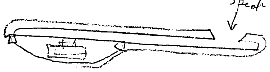
950 000 000

$\frac{5}{1000}$

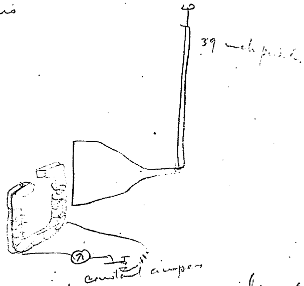


May 15 1886

Telephone



Is iron merely a non polarizable material whereby ~~contact~~ is made with the air to produce stress, ~~for~~ Try this

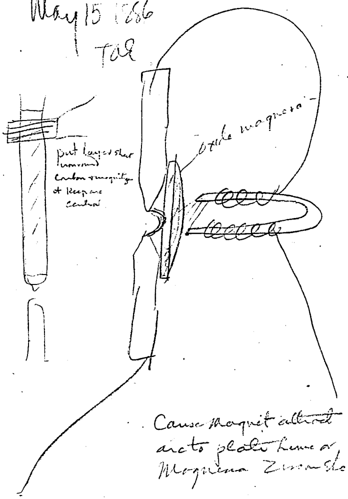


Hollow core pour various liquid in see if change lines force —

Note — Try if alloys of iron with other metals are magnetic investigate their properties.

May 15 1886

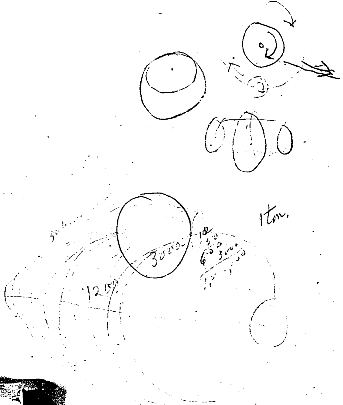
TAE

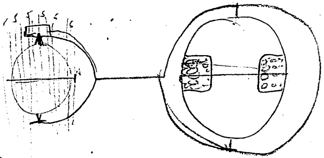


Cause magnet ~~attract~~ arc to plate hence a Magnesia Zinc &c.

Trillions

29.





Notes -

Comet dilatate as they recede + contract as they approach The Sun p 102 Vol 6 Astron Society - Herschel

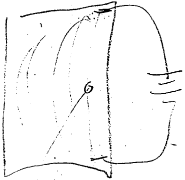
Tail of Comets always point away from Sun -

in Sun spot period Corona extends great distance from Sun Spectroscope shows its gas - non sun slight Corona + shown in Spectroscope that light comes from solid - Color white while extended Corona pink - ~~one~~

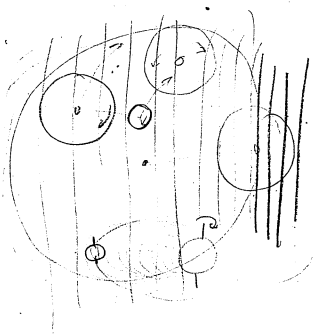
my theory is that Electric arcs occur on surface Equatorial part sun reduce Emf on parts & give great dif Emf where arcs are, & lines of force from sun ~~throw~~ are out into space, as magnet throws arc of arc light, one picture shows several 'Corona streams' ~~[illegible]~~ Knife shaped, These are matter from arc's throwed out by lines of force -

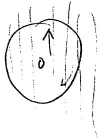
May 17 1886 TAE

Apply Magnet also
Coil also current
to increase sensitiveness
to Astronomical observations

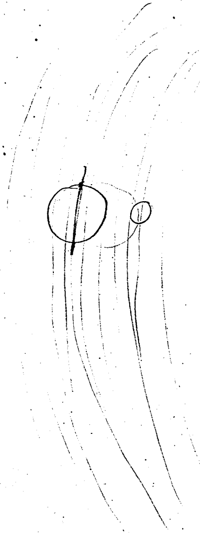


Hydrometer - see if specific grav
increasing



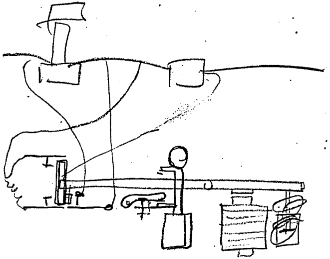


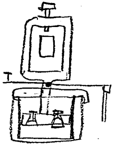
24
27
168
48
648

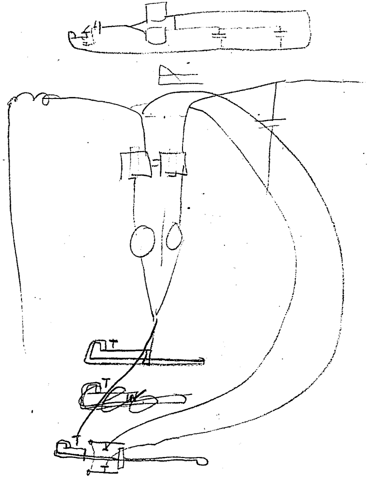


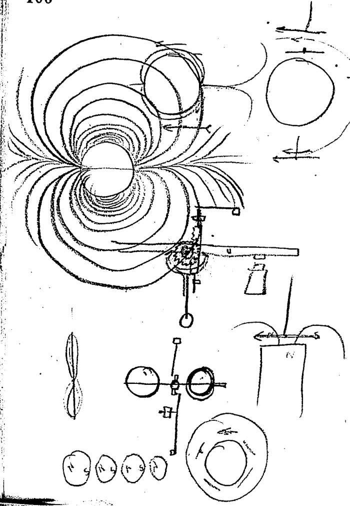
2400
2950
12000

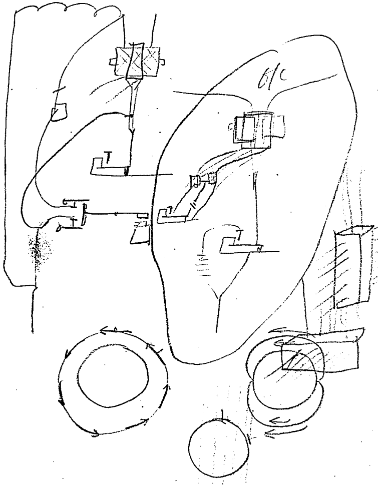
2400
2950
2400
1180000
5900
608.0000









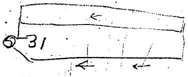


220000
342422
562422

22000
862 413
257.429

220
220
44 0000
440
484

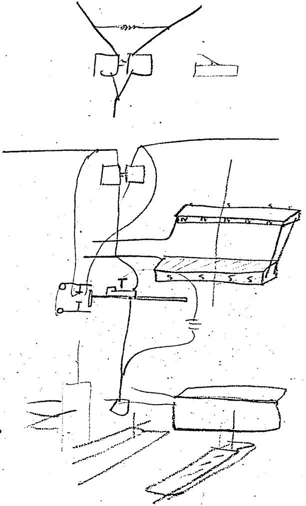
22



22000
30103
52103

65.821

22000
3424
25424



365
365
1825
190
2190
1095
1332
25 Earth

0.7233
4
2.8932
4
11.5728

115728) 93.000.000 (

224 Venus
224
896
448
448
5017 6

115

11572) 133225 (11.501
115728
17
1772
115
93
30

36

1000
4
4000
4
16000 Cube Units

11572 – Venus

11572) 50176 (4.3
46288
38880

6000
4
24000
4
96000

1000) 96000 (96
9000
6000

16000) 133225 (8.326
128000
52230
48000
42500
32000
10500

1000) 115728 (115.728
1000
1572
1000
5728
5000
7280
7000
2800
2000
8000

.7233
.7233

3653
3653
10959
18265
21918
10959
133444

7233
4
28932
4
115728

115,728) 133.4440 00(1153
115 728
177160
115728
614320
578640
3568 00
347184
9616

365
365
1825
2190
1095
133225

224.
224.

365.3² : 224.7² :: 1 : .7233³ |

~~1334440~~. :
133225 : 50172 :: 1 : .3284188

.7233
.7233
21699
21699
14466
50631
.52318289
.7233
156954867
156954867
1046365678
3162280023
.32844818433 7
133225
16420909216885
6568363686674
6568363686674
8054543 3011

133225
.3284
532900
1065800
266450
399675
43750.0900

1000
43750

50176 = 43750

33225
43750
88288937500

133225
43750
6661250
932575
39970 8

356.3² — ² :: 1 : .7233³

356.3 — :: 1 : .7233
.7233
10689
10689
7126
24941
257.71179

7

356.3 : 257.7 :: 1 : .7233

126949.69 : — :: 1 : .378403718
.37840371

12694969
88864776
38084107
50779876
101563752
88864783
38084907
48037.8736703429

356.3
356.3
10689
21378
17815
10689
126949.69

224.7
224.7
15729
8988
4494
4494
50490.09

43750 | 133444.09 | (3

356.3
.7233
10689
10689
7126
24941
257.71179

.7233
.7233
21699
21699
14466
50631
.52316289
.7233
15694867
15694867
104632578
36621402 3
.37840371 8327

133225
.328418
1065800
133225
532900
1065800
266450
399675
43753.488050

3 : 9 : 1 : — 3

3)9
3

3 : 9 :: 1 : 3

3 : 9 :: 1 : —

3) 9
3

3 : 9 :: 1 : 3

36.3²
36.3
1089
1826
2191 8
10959
133443.09 : — :: 1³ : .7233³

133443.09 : — :: 1³ : .378503718337

133443.09 : 55068.7 : 1 : .378503718337

50508.70 | 226.8
4
105
40 | 80
2508
440 | 2240
4520 | 26870
27160

.7233
.7233
21699
21699
14466
50631
.52316289
.7233
156948867
156948867
104632578
366314023
.378503718337
133443.09
340653346533
113551115011
1514014873348
1514014873348
113551115011
113551115011
378503718337
50508.70576137894133

25.

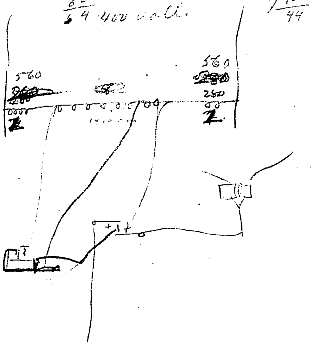
560
8
4480

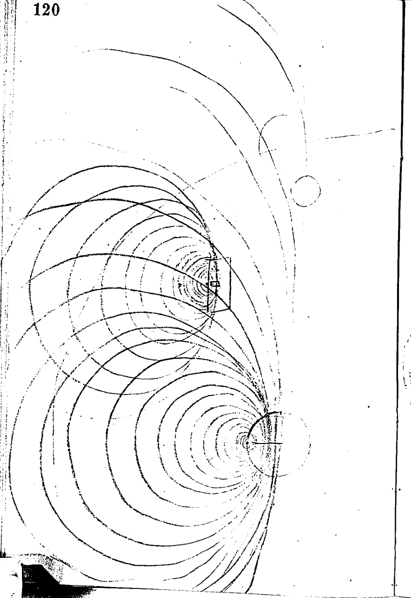
135
12
270
135
1620

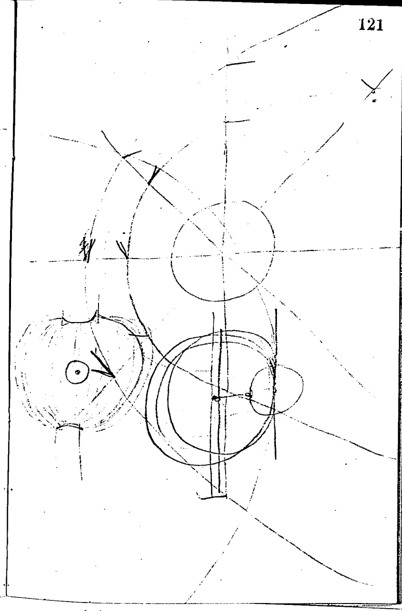
4000

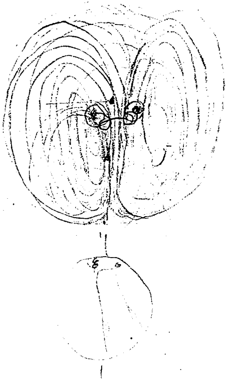
4400

11 |400 (36
33
70
66
4 400 volt.









40

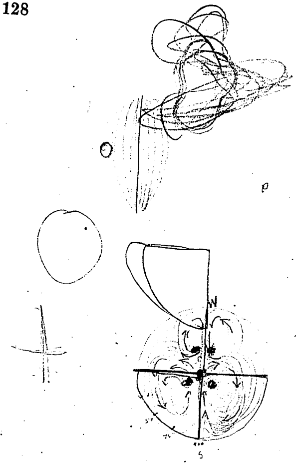
12800, 32 B T
25600 128
51,200 512.
102 000

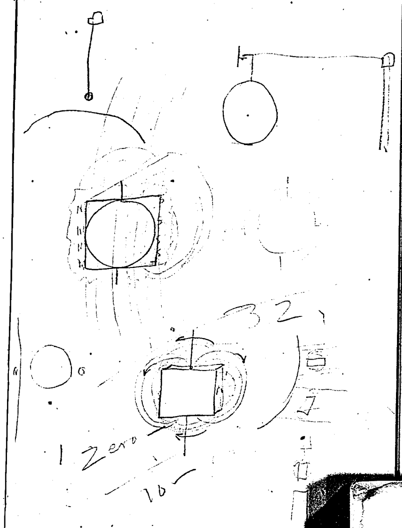
1 ohm 1 amp
1 oz cop

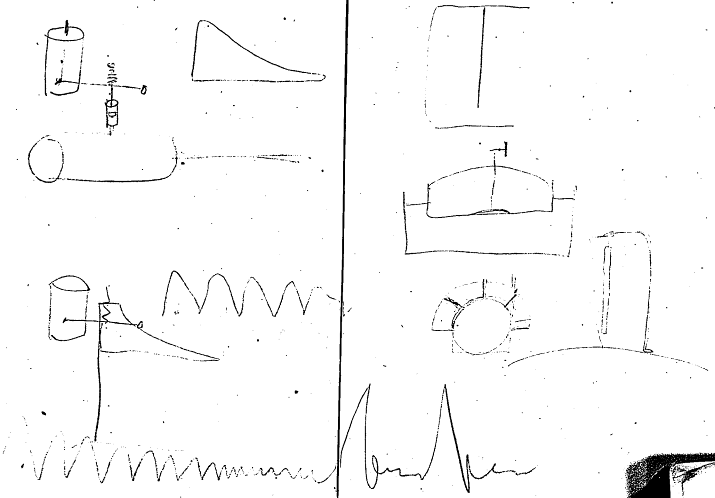
2 foot 1 lb Copper 1 amp
4

	500 tons
4096	~~1048576~~
8192	2000
16384	8000
32768	32000
65536	128,000
131,072	512,000
~~262144~~	
100 miles	2,048,000
200	8 m
400	32
800	128 m
1600	512.
3200	2 B Tons
6400	8 B
12,800	

1	1
2	4
4	16
8	16
16	64
32	256
64	1024
128	4096
256	16384
512	65536
1024	262144
2048	1,048,576


N
S


3 2
1 Zero
10



Mercury 214.500 000.
Venus 400 500 000.
Earth 555 000 000.
Mars 846 000 000.
Jupiter 2 880 000 000.

Lengths Orbits in miles

Mercury 789.888 — miles travel axial circum in Rev
Venus 5,147,774
Earth 8 670.210
Mars 8,666,238
Jupiter 1 035 870.000

Mercury 2992
3
8976.
87
62832
71808
7809 12
81976
789,888

7918
3
23754
365
11877 0
142524.
71262
8,670,21

86000
3
258000
4015
129000
1258 0
103200
103587000

4211
3
12633
686
75798
75764
101064
75798
8666,238

141 000 000
2
282 000 000
3
846,000 000 orbital Miles
Mars

480 000 000
2
960 000 000
3
2,880,000,000
Jupiter

35.750 000
2
71,500,000
3
214,500,000 orbital miles
Mercury

365
11
365
365
4015

66.750 000
2
133,500,000
3
400,500,000 orbital miles
Venus

92500000
2
185000000
3
555,000,000 orbital miles
Earth

7660
3
22980.
224
91924
45962
45962
5,147,744

 Trace Cutting

Orbital mercury 213,720,112
Venus 395,352,226
Earth 546,330,000
Mars 837,333,762
Jupiter 1 844 130,000

Dia - mercy - 2992
Venus 7660
Earth 7918
Mars 4211
Jup 86,000

395
2
790

Dist from Sun -

Mercury - 35.750 000
Venus 66.750 000
Earth 92-333,000
Mars 141 000,000
Jup 480 000,000

546
2
1092

25

400
05

27
4
108 600
4
432

214 500 000
789 888
213,720,112.

400 500 000
5 147 774
395,352 226.

555 000 000
- 4 670 000
546330 000.

846 000,000
8 666 238
837 333 762

2,880 000 000
1 035 870 000
1,844,130 000

4211
4211
4211
4211
8422
16844
17,732,520, Mars

7660
7660
45960
45960
53620
58,675,600 Venus

86000
86000
516000000
688000
7396000000 Jupiter

85914000

The sqrs of their dia divided in
their real distance orbital

21 443

7918/546 330 000 (

86000/ 1,844 130,000 / 21443
172000
124130
86000
381300
344000
37300
34400
29000
25800
3200

21.443
86000
128658000
171544
1844,098

0

837 000 000) 1,844,000 000 (2.022
1674
170 000 000
1674
174

837 000 000

4) 194444
49600

7760
18
62080
7760
139,680

2.022

467
4
18.68

395) 1844. (4.67 times to go
1580
2640
2370
2700
2625

4211) 837 333 762 (198844
4211
41623
37899
37243
33688
35557
33688
18696
16844
18522

7660) 395 352 226 (51612
38300
12352
7660
46922
45960
9620
7660
19626

206448

198
42
396
792
831

4) 51612
12903

214433

7660
51
7660
38300
390660

21443
7
150101

21443
4
85772

198
51
21

76
51
76
380
3876

86

51612
9
464508

104) 490 (4.7
416
740

49 —
10.4 7⁰ 4.14

88) 224 (2.5
176
480
440

25
16

25
25
125
50
625

224) 365 (1.6
224
1410
1344

88) 365 (4.14
352
130
88
420
352
323

7 - 87

16
16
96
16
256

323
323
969
646
969
104329

3.23
4
1292
1292
2584
11628
2584
377264

7.396 000000) 1.844.000 000000 (024
1479 200 000000
364 800 000000

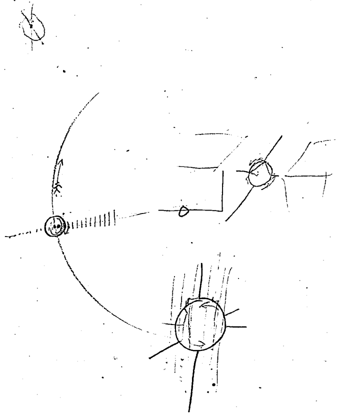
024
432
048
072
96
10368

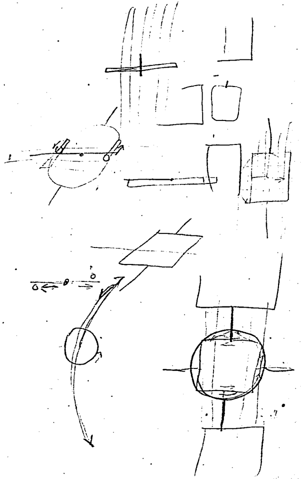
.024
6.9
49

42

58.675.600) 395.352 000 (6.9
357 453 600
43.298.400

17) 837.000 000 (49
68
157
153
0





439.

15 | 4211 (2
30

18 | 7918 (439.
72
71
54
178
162

1351 | 791800 (586.12
6755
11630
10808
8220
6755
5650

18 | 79

27 | 365 (13.52
27
95
81
140
135

16 | 852 (53.
80
52
48
4

1838
1838
14704
14704
5514
14704
1838
3378244

1 1
1 4
2 16
4 64
4
16

56 | 555 (9
527
8

15
15
75
15
225

16 | 141 (

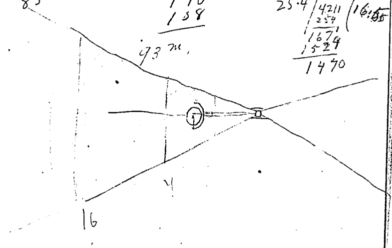
Mars 16.5
Earth 58.54 | 92.00 (1.6
58
3 40
32 8

284
3
852

27 | 686 (25.4
54
146
135
110
108

25.4 | 4211 (16.55
254
1671
1524
1470

93 m.



42

1,00	1,25
1,20	5,15
2,80	2,50
1,65	1,60
2,50	2,75
1,25	1,65
,95	1,65
1,10	2,35
,70	2,65
1,30	\$52,75 – flower seeds only
1,50	page 8 to page 21
3,55	
2,50	
1,00	
2,45	
2,80	
55	
1,40	
2,65	

12

52,75
1,30
2,85
5,20
7,65
32,25
102,00

grasses

\$1,30 –

Everlastings –
,50
2,35
2,85

Climbers
1,00
1,35
1,85
1,00
5,20

greenhouse –
4,80
1,40
1,45
7,65

Seeds Rare & Beautiful plants,

3,10
8.25
7.55
13,45
32,35

177,30
281,90
192,30
111 25
240 00
272,50
1275,25

Rare & Beautiful plants,

8.85	28,00	7,00
2 25	4.25	7 00
14 55	15.50	15,00
22,25	4.75	7 15
19.50	27.50	5 00
10 90	2,75	9.25
5 25	10.00	8,25
8,75	5 25	6,00
2 00	5 00	7.00
6,00	1 25	5,50
11 00	23,75	1 00
3,50	25,00	8,00
8,00	38,00	3 00
17 75	13 00	22,25
1,60	14,00	12,25
6.00	9,00	8,00
7.15	2 00	9,50
4,50	6 00	32,00
17.50	6 00	4,40
	7.50	8,25
	20.00	6,50
	6.50	
	7.00	
177 30	281,90	192 30

6.00	5.00
8.00	4.00
3.00	1.00
8.00	5.00
2.50	2.00
3.50	7.50
2.75	2.00
2.00	1.50
3.50	2.00
6.00	16.00
3.50	4.50
3.00	3.00
6.00	22.00
4.00	14.00
6.00	25.00
16.00	37.00
6.00	17.50
4.00	34.00
2.00	30.00
6.00	5.00
2.50	2.00
5.00	
2.00	
111.25	240.00

5.00
3.00
5.00
4.00
40.00
5.00
19.50
13.00
65.00
25.00
2.00
12.00
27.00
21.00
6.00
4.00
20.00
11.00
16.00
8.00
272.50

Aurora — Copper No 8 to Boston
300 Volts dif — 10 000 ft lbs
inch copper wire, — inch wire
18 horse power ~~Rod~~ foot dia 2592 hp —

240 miles, 300. volt.

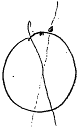
240
16
1440
240
3840.

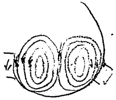
0

144
18
1152
144
2592

300
300
90000
44
360000
360000
3960000
3840) 3840
12000
11520
4800
1031

1031
9
9279
64
37116
55674
593856





44
16
264
44
704

704
144
2816
2616
704
101376

5220
5220
104400
10440
26100
27248400
100
2724840000
ft lbs 82570
33000
272484000
264
84840
66000
188400
165000
234000
231

2592 -

1 Volt per mile. $\frac{1}{4}$ inch wire. 44 ft lbs.
inch 704
foot $3\frac{1}{3}$ horsepower.

100 000 ft lbs per square foot per mile, of Copper. melted glass say 1000 more than 100 ft lbs per mile + square foot

Square mile ~~[illegible]~~ 82570 hp.

82570
33000
2477100000
247710
2724810000

15

30

.5000
5000
25,000,000

82570
25 000 000
4128 50 000 000
165140
2 064 250 000 000

14,6

23 | 365 (14,6
25
115
100
150

146
24
584
292
3504

10 14.6
10
146.0 146

5. 550.

33000 / 5.500 000 000 000 000 000 (166666666666
33000
220000
198000
220000
198000
010

14. | 30686.

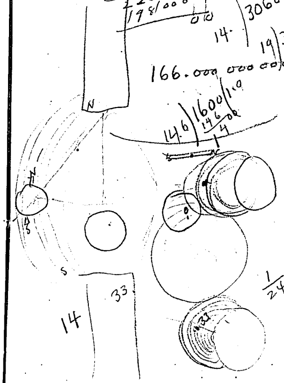
19 | 3066, (160
19
116
114

166.000 000 000

14.6 | 1600 | 1.0
146
14

24 / 360 | 14,1
240
120
96
14.2 4/4

60

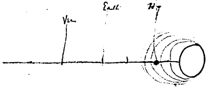


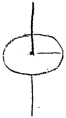
1/240

2°

5,4 -

16.773



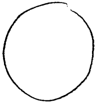


470
5.4
1880
2350
25380

470
5.5
2350
2350
26850

5 -

470
5.3
1410
2350
24910



11.1

3.9
7 2
11.1

17.2

25 -

22
34
56

28

4 3

4, 7, 13, 25, 49, 97, 193,

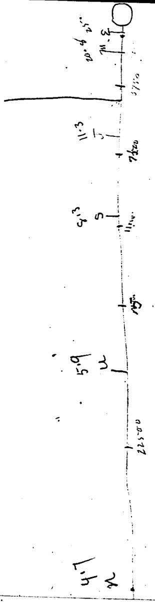
4 - 7 - 10 25 52 95 192 284 300

1

3.9
7 2
11.1

11
10

6) 148.6
18



41

1st

The sun is a solid globe of molten matter revolving on its axis once in 25-$\frac{8}{1}$ days.

2 A powerful Electric Current circulates around the whole of its body from west to East parallell with the Equator and to the poles,

3 This Electric current is sufficiently strong to keep all its matter Except at the poles and Center at vivid incandescence.

4. ~~breakage in~~ Lines of force ~~are~~ pass through its body in the same manner as a Cylinder of wire wound so the wire would be in the same direction as the Currents Circulating in the incandescent matter, ~~[illegible]~~

1/2 ~~[illegible]~~

half of these lines pass through
the sun the other through space
from pole to pole ~~forming~~ a Vortex

5- Excentricity of the lines of
force due to the attraction of
the sum total of the lines of
force of all the planets + stars
Causes the sun in its rotation
to Cut its own lines of unequal
strength + thus produce its
Current, + heat,

6. planets are held in their
orbit + propelled by the mutual
attraction of closed circuit Currents

7 Except the shell all planets
are molten a conduct Electricity

8 The lines of force weaken as they recede from the sun at the square of the distance hence The 1/2 of the planet nearest the sun passes through lines of force stronger than the 1/2 furthest from the sun This difference produces powerful currents in the matter matter + causes rotation of the body on its own axis.

9- These currents causes lines of force to proceed out of the ~~earth~~ planet and produce a field ~~dysy~~ disymmetrical with the axis so the magnetic poles are never the astronomical poles

10. This system shifts ~~completely~~ at
Every revolution of the planet
hence there must be a diurnal
variation of the needle, & since the
axis shifts there must be an
annual, & since the ~~sy~~ symmetry
of the lines of force are disturbed
by planetary conjunctions there
must be secular variations,

11. One 1/2 of the planet is powerful
Electrified N & the other S.
~~by these~~ passing through the lines
of force the poles of which
are in the Equatorial, no [illegible] –
The signs should change once
in 24 hours and have 2 max
& 2 minimum in potential for
the Earth.

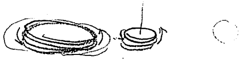
12 - ~~Incandescent~~ matter in Vacuo or space conducts Electricity like a metal ~~when the~~ between an incandescent substance like the sun and other ~~incandescent matter~~ as or ~~pro~~ cold conductor as proved by the Center wire in filament Lamps.

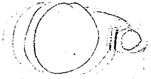
13. gravitation attraction has no existence ~~[illegible]~~ all weights are due to Static or Current attraction.

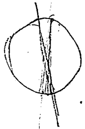
14. Lines of force proceeding from the N pole of the sun to the south. pass along

the circumference and by
Curved lines toutwardly
to ~~the End~~ unlimited space;
The Body of lines of 1/2 section
of ~~the ring a s~~ of the
ring of the Vortex is the
line of balance, magnetic
or Conducting matter on this
line is neither attracted or
repelled by the ring of any conducting
Matter having a Current
in it or Electrified is in
space between this line +
the same it will be
repelled of on the other
side, attracted

15 – Sun spots are due to faults in the matter surface of the sun an Electric arc forms across the fault the two side will have less current & diminish in temperature & appear darkly compared, the arc being mobile & conveying a current will be attracted outwardly to the center of strength of the lines of force just as an ordinary Electric arc tends to go to the center of the L of F of a magnet, The arc breaks long before it reaches this point hence the incandescent matter surrounding the sun –







16 prominence are arcs of small differnce of potential but with great current strength due to great mass of matter

17 The tails of comets are due to the breaking of the arcs from repellent action as the approach the sun

18 Differnce in Conducting power of different parts / molecule of the specific gravity must be connected

19 all planets were once projected from the sun

by faults in the Equatorial
~~strata~~. The region from
which they were projected
was at dif temperature velocity
& the matter must have been
necessarily diff-t, The
moment the ~~same~~ general
current of the sun ceased
to pass through the detached
matter altho' then nearly
ceased ~~but the pr... there~~
~~still keep ... sheltered~~
& it was thrown off
into space where getting
a rotary motion ~~and~~
adopted a very eccentric
orbit & rotated on its
axis. & finally ..

Eccentricity diminished & it took its regular orbit

19 Comets are matter recently thrown from the sun The reason comet can never fall in the sun is that they have powerful currents in them & if they pass Mercury towards the sun they pass the line of no attraction to the line of the repellant

46) 2264 (61.913
276
88
46
420
2243
60
46
140

61 913
264
883

6 1913
46
10773

IV VII CVII

MMMM

+ + + + + + M DCC LXXVI

+ + + + + + + + + + + +

DCLVI

+ + + +   + + + +   15744

CCI

LVII

+ + + + + + +

LXXVII

XXVII

so periodically of seen spots
is produced by shifting
farther from the sun the
neutral or non attractive centre
of ∠ of F by Approach of
Jupiter or other planetary
Conjunctions ~~as~~ more powerful
attraction of the arcs cause
many to break & thus produce
a disarrangement of the
Equatorial surface demanding
great number small arcs
& creating few *large* arcs
& Consequently spots by
Comparison & by depriving
the poles or Edges of faults
of currently Conduction

Earth LF ship 14.6 times.
Venus ——— 8.96
mars ——— 27.44
Jupiter 173.28

Earth, dia mul ship
1,157.19
7 074 9
11 068.

7926
7896
4070
92,164

1000
885
118
300,000.

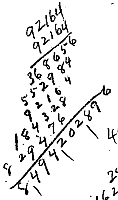
25) 4332 (173.28

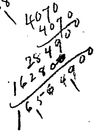
25) 686 (27.44

25) 224 (8.96

14) 1000 (70.

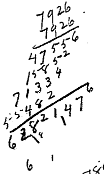
9) 885 (98.

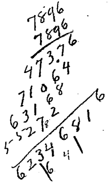


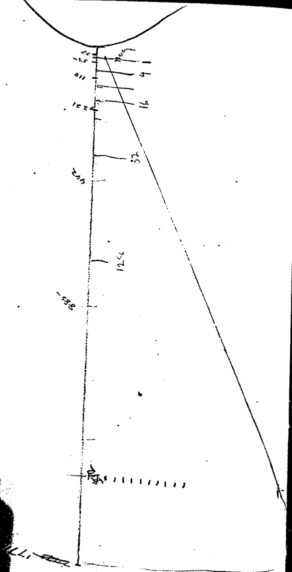


Earth

62 821 476
62 346 816
16 564 900
8.494.202.896



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32
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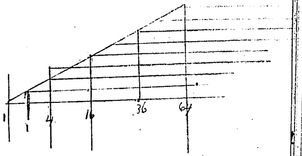
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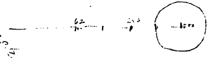
1
4
16
36
64



2857
3
8553

860000 430 000
860 000
1,720,000
3,440,000
6,880,000
13,760,000
27,520,000
110,080,000,

100,000,000
25,000,000.
12,500,000
6,250,000
3,125,000
1,562,500
781,250

35)1000(28.57
70
300
280
200
175
250
215

1225)19881(16.22

1225)4336(315
3675
6810
6125
685

1225)8464(6.9
7350
11140
11025

633)1000(1.57
633
3670
3165
5050
4431
619

1000 — Mercury 1
Venus 3.5
Earth 6.9
Mars — 16.22
Jupiter 188.00
Saturn 633.00

188)1000(5.37
940
600
564
360

1622)100000(67.6

1225)776.16(633
7350
4116
3675
4417
3675

663)1000(1
663
37

663)1000(1.5
663
3370
3315
55

2992) 7660 (2.56
5984
16760
14960
18000
17952

881) 1000 (1.13
881
1190
881
3090

29.55.   256.

2992
2992
5984
5984
26928
26928
5984
8952064

21
21
21
42
441

29
29
261
58
441) 841

441) 1000 (2.12
882
1180

256
350
6.06

2.56.

7660
7660
45960
45960
53620
8952064) 58675600 (6.55
53712384
4963216

Strength line a force
Mercury being unity

Mercury	1000
Venus	— 285
Earth	— 145
Mars	— 67.6
Jupiter	5.31
Saturn	1.57

Mercury	~~1~~
Venus	3.5 less
Earth	6.9
Mars	16.22
Jup	188.00
Saturn	633.00

29
20
261
58
847

$8952064 \overline{)\,17732511\,}$ (1.9
8952064
878044 70
805 63 576

4211
4211
4211
4211
8422
16844

$8952064 \overline{)\,17732511\,}$ 4
70930044

17732511
19
159592599
17732511
336977709

$102400 \overline{)\,17732511\,}$ (173.
102400
749251
716800
32451

15
15
75
15
225

Square the orbital velocity + get its value as compared to Mercury square,

Square Mercury Then square the other planet. Div sqr of Mercury in this square. Multiply the square of this planet by the product, ~~then div square of mercury in this~~, This gives strength line of force. Mars came out 15.05 should 16.22.

3369770
4

$8952064 \overline{)\,134767080\,}$ (15.05
89520640
45246440
44760320
486120

8

64) 841 (13
64
201
192

13.

86000
86000

516000
688000
7396

13
4
52.

7396

7,396 000.000 (16 825

Square of 89 8,952,064.

825.

Given 8952064) 7,396.000.000 (82

188) 825 (4.
752
730

13) 825. (63.4
78
45
39
60
52

7396 000 000
825

188
63
564
128
11844

89

86400) 240000 (·28
172800
67200

24
60
1440
60
86400
2400) 86400 (3.
14392

86000
3
10) 258,000 (25800.

24.
1000

60
60
3600
216

10
60
600
60
36000) 258000 (7.16

7918
7918
63344
7918
71262
55426
62694624

806
716
90

16

16
2
32.

1.9
2
3.8

8952064) 79280500.000000 (88.9

2.56
2
5.12

13. [illegible]

16
2
32

188
366
1128
1128
564
68808

188
13
564
[illegible]

806) 2955 (3.66

366
4
1464

2955

18800
1464
75200
112800
75200
18800
27523200

1420) 2955 (2.
2858
97

on surface sum 440. — 1000
880 4 less
1320 9
2200 16
5 – 35204 – 25
6 – 57720 — 36
7 – 9240 — 49
8 – 14960 — 64
9 – 24000 — 81
10 38960 — 100
11 62960 — 121
11 101.920 — 144
12 164880 — 169
14 266400 — 196
15 431680 — 225
16 – 69.8480 – 256
17 11.30160 – 289
18 18.28640 – 324

19 29.58800 – 361
20 47.87.440 – 400
21 7.746.240 – 441
22 – 12533.680 – 484
23 – 20279920 – 529
24 – 32813.600 – 576
25 – 53093520 – 625
26 – 85907120 – 676
27 – 139.000.640 . 729
27 – 224907760 . 784
28 . 224907760
2 363.908400

440000) 92.333000 (208.2
88 000 00
4 333 000
3 520 000
813 000

208
208
1664
416
43264

440000) 141.000000 (325
132 000 00
9 000 000
8 800 000
200 0000
176 0000
24

326
320
6400
960
1.0240

440000
325
220000
88000
132000
143000

440000
3250
132000000
1430000000

324
324
1296
648
972
104976

3

440000 (141.000000 (320
132 0000
9 00000
8 80000
200000

81250.

440. / 35.750000 (81250
35 20
550
440
1100
880
2200
2200

440000) 35750000 (81.241
35 200000
550000
440000
110000
88000
220000
440000

81
81
81
648
6561.

152
152
304
760
152
23104

440000) 66.750000 (152
44 0000
22750000
22000000
750000
440000
310000

1009
1009
9081
1009
1018081

440000) 480 000 000 (1009
440 000
400 0000
39 60000
440 000
3

2992

Venus

23104) 58.675600 (2539
46208
124676
115520
91560
69312
222480
207936

6561) 1,000,000 (152
6561
34390
32805
15850
13122

21
21
21
42
441) 2539 (5

LF
6561) Mercury 8952064 (1364,
6561
23910
19683
42276
39366
29104
26244

841) 1364 (1.6
841
5230
5046

29
29
261
58
841

480000000
2
960000000
3
2880000000

Surface of sun (400000 - 1
6561 times weaker
Mercury
Venus 23104 "
Earth 43264 "
Mars 109400 "
Jupiter, 1,018,081

Mercury 152.

Mercury 1364
Mars 173.
Venus 2539

Mercury — 1.9 - less than Mars.
6.55 less than Venus
825 less than Jupiter

86
86
0

8760 000) 555 000 000 (63
525 600 000
29 400 000
26 280 000

365
11
365
365
401
300
4315
24
17260
8630
103560

688
1396
925

7396

555 000 000

800
6

10) 258000

25800

92

11) 108 000 000 (134

13) 555 000 000 (42,
52 000 000
35 000 000
26 000 000

103560
25

148 ,2,000,

1,621 000,000

103560

1,621 63560
25800

2,880,000 000) 2,731,848 000 (

2 731 848 000) 2 880 000 000 (1.0
2 731 848 000
1,48,152,000

35 340 000
2
70 680 000
3
88) 212,040,000 (2409545
176
36
35 2
840
792
480
440
400
352
480
440

1186
365
5930
7116
3558
88) 4328 (49
352
808
792

86
3
258,000

2409545
40
21685905
9638180
118,067,7

118 067, 705

Mary 2 409.545 day
212,040-000 yearly
gap 118 067 705 yearly

81,952. | 7,396,000 (802
71616 00
23,44 04

258,000
365
1290000
1548000
774000
94170000

118067705
94170000
23897705

60
60
3600
24
14400
7200
86400

3974) 86400 (21.74
7948
6920
3974
29460
27818
16420

30) 2589000 (86
240
180
180

24) 86000 (3583
72
140
120
200
192
80

4390) 86400 (19
4390
42500
39510
29900

24) 103200 (4300
96
72
72
240
216
240

25) 2580000 (103200
25
80
75
50
50
0

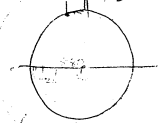
3583) 86400 (24.1
7166
14740
14332
4080

27.

860000
3

27) 2589000 (95553
243
150
135
150
135
150
135
150

24) 95553 (3981
72
235
216
195
192
33



3981) 86400 (21
7962
6780
3981
27990

24) 95384 (3974
72
233
216
178
168
104

3974 hour

860
3

26) 2580000 (95384
234
240
130
100
78
220
208
120

7.396-000,000
62 691 000

10) 24 (2.4
20
40

62) 7396 (119
62
119
62
576
558

7918) 86000 (10.8
7918 00
682 00

729) 512656 (703
5103
2356

8600

90) 18110 (21.2
180
110
90
200

.90) 18380 (242
180
380
360
200

27
27
189
54
729

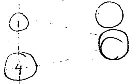
2.28
4.56
716
716
4296
716
5012
512656

806) 1838 (2.28
1612
2260
1612
6480
6448

614) 1440 (2.34
1228
2120
1842
2780

5) 70
87

2.34 — 8.7 times dia
9.36



Earth 18.38 miles Sec orbital
" Less axial 18.11 "
Earth 1.
Jup 27 times weather place — X[20]
Jup 119 times larger in bulk.
" 10.8 larger dia.
orbital vel 2.28 times less. 8.06 miles sec
~~orbital axial~~ axial. 7.16 sec.
orbital less axial .90 mile sec.

Earths axial .27 mile sec.
Jupiter max 2.4 axials to 1 of Earth

1186
1186
7116
9488
1186
1186
1406596

19
19
171
19
361.

28.7

86
86
516
688
7396

70
70
4900,

9
9
81.

2992) 86000 (28.7
5984
26160
23936
22240

24
4
96.

149769
387
1048383
1197152
449307
57957063

Suns Surface moves 3947 miles p hour

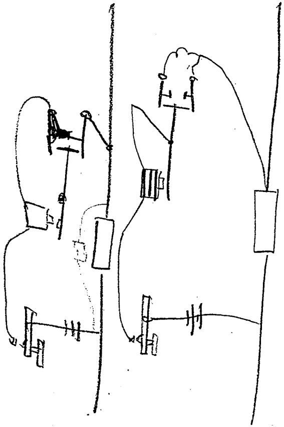
X[20] Speed of Jupiter orbital less axial 9 per sec which is 2.2 less than Earth less axial – Jup is in 27 times weaker L of F position.

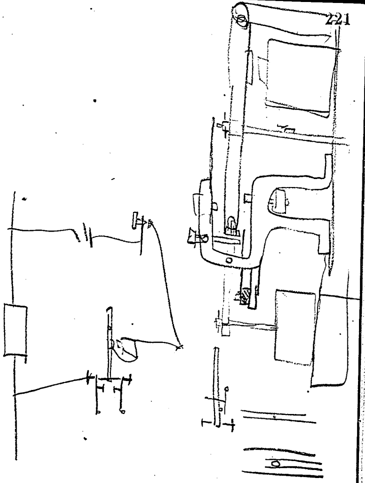
~~Axial Rev is at 1/2 Sqr of the dia. (1e) Square the axial Rev & then will give the dia [illegible] compared with any other planet.~~

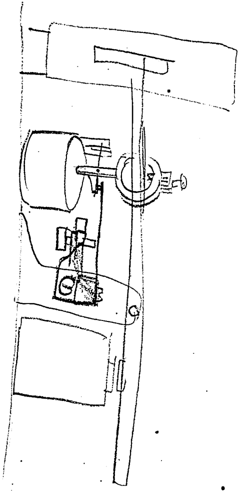
Saturn Uranus 81 ~~361~~ times weaker [illegible]

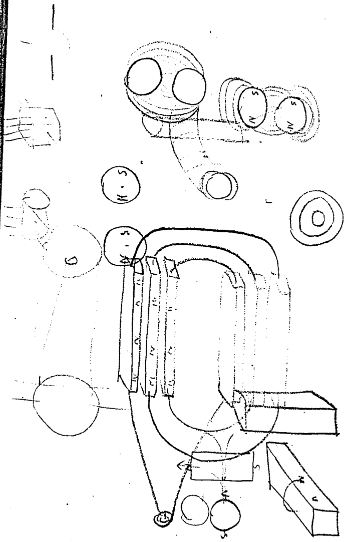
0387) 0387.0 (

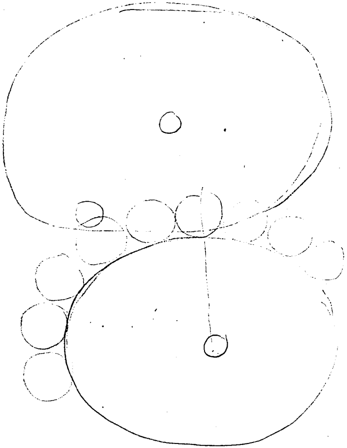
3364

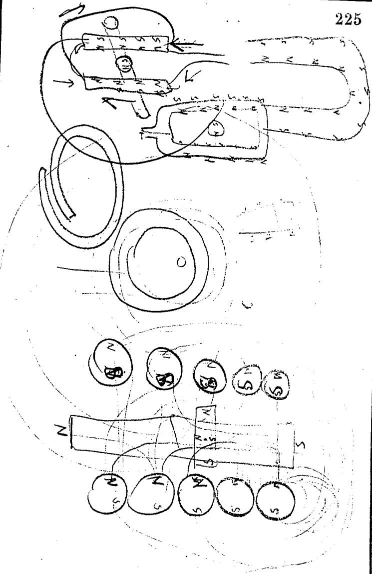












Square [illegible] to Elips.

div yearly Rev in years

& square that,

88 | 4013 | 45

352

493

440

229

229

2061

458

458

52441

365

11

365

365

4014

88 | 365 | 4014

352

130

88

420

414

414

1656

414

1656

171396

16.54

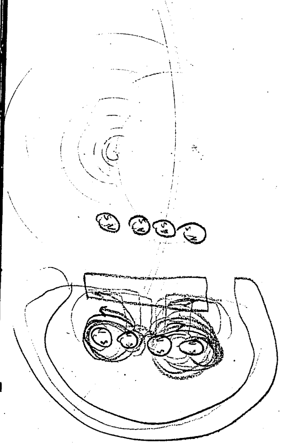
45

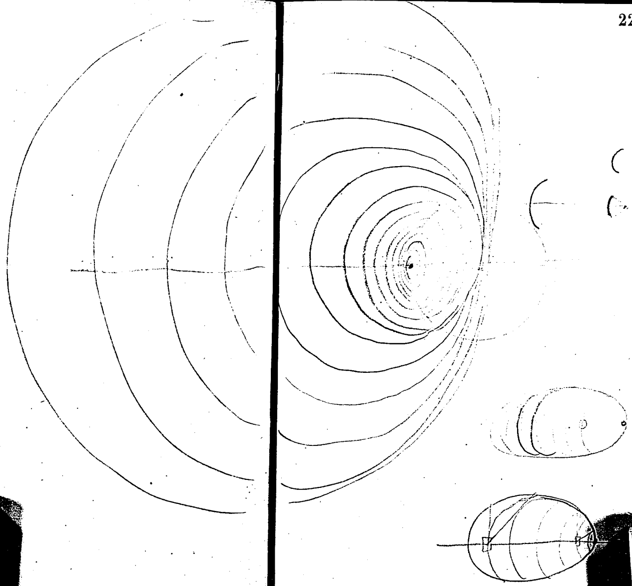
45

225

180

20.25





24) 1,296,000 (54,000
120
96
96
000

24) 691200 (28800
48
211
192
192
192
00

105330
24
421320
210660
2527920

42,665,500
28,119,716
14,545,784

977621 7344
972232 5129
4789 2215

77050
24
308200
154100
1849200

$\frac{2}{5} \times \frac{1}{5}$

.1
.01

92965489
89894951
3070538

$\frac{1}{10} \cdot \frac{1}{10} = \frac{1}{100}$

183570 0854
167200 1276
163,699,578

66588 8947
66677 009
9089 938

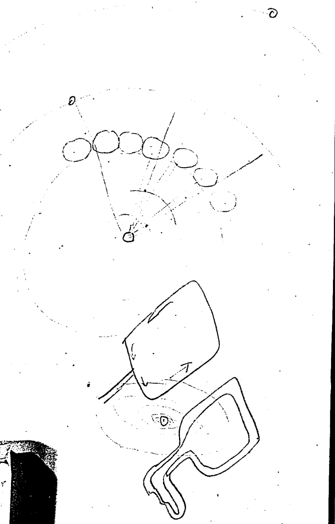
12

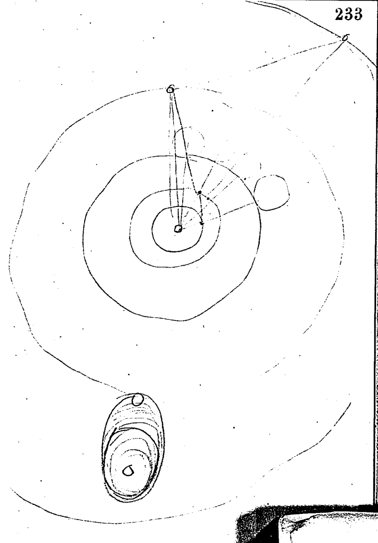
4986037628
4527825326
458212302

65533
24
262132
131066
1572792

12000
24
48000
24000
288,000

$\frac{01}{100}$





85741
13333
14792
10234
47382

85741
38359
47382

5765
1334
1562
2869

5765
2896
2869

785
250
320
169
46

4850
1560
2490
500
300

7874
1160
1729
1957
1433
1595

8642
815
8827

8642
168
647
8827

10000
4397
2498
3104
10001

9999

25000
7500

~~325 00~~
35

2000
425
275
150
175
225
575

175

25000
7500
3500

000

75000
21000

000

21000
7500

28500
3500

25000

35

800 00
150 00
177 50
145 45
250 00

79,05

13

25000.
7500
3500

14000

15.495,25
13 500 00

1 995,25

11275
745

560
475
1500
11,275

13,810 00
745 00
873 50
563 75

19985

13,810,00
745 00
873 50
563 75

11,627,75

2 1.9

3 ,50
3 69
0 ,70
5 ,00
11 50

17,85

1785
70
500
1150
969

684612
42161
38164
28196
576091

684612
108521
57,609.1

42641689
862148
362
51613
842
2
681
41926041

42641689
915648
41,726,041

86421316
862141
3162
486143
89164
84980706

86421316
1440610
849,807,06

261438912
4639816
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4861
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261438912
7335226
254103686

4261814692
16429841
3642168
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4241450270

4261814692
20364422
4241415027

40729
8
325832
9
2932488

85
35
425
7
2975

85
35
425
255
29.75

248
6
1488
9
13392

98
2
196
8
1568

40729
72
81458
285103
2932488

248
54
992
1240
13392

5090
700
3563000

5090
700
3563000

2600
140
1040
26
3640

2170

26
140
1040
26
3640

35600
12500
178000
712
356
445

8542
2500
42710
17084
21355

7355
6000
44130000

2600
140
1040
26
3640

65000
25000
325000
130
1625000

4109

2600
140
1040
26
364

7661
7300
23043
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5607

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178000
712
356
44500000

35600
12500
178000
712
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445000000

876000
25600
5256000
4380
1752
22425000000

87200
23000
2616000000
1744
20056000000

90700
50700
63490000
45350
4598490000

607000
908000
4856000000
5463
551156000000

90700
50700
63490000
45350

908000
327000
6356000000
1816
2724
296916000000

8) 4187002
583375 2/8

450
625
300
13.75

60

9) 83702507
9300278 5/9

70 77

2

9) 83702507
9189051

27/6

17 80

8) 4187002
523375 2/8

6) 3201567
533594 3/6

60

7) 9876504
1410929 1/7

9) 30564
3396

46) 2952 (64.
2766
184
184

54

19

83

4) 2952
6) 738
123

24) 2952 (123.
24
55
48
72
72

841

9) 2952
9) 328
2) 36 - 4
18 = 2

83) 2952 (2

2

18

8) 22824
9) 2853
317

9 6 63

11
11

5622

7) 68824
8) 9832
2) 1229
11) 614 - 10 5.009
55
64

8

10) 64440.
13) 6444 (5
4) 2148
537

4

4962
68

56) 68824

6

5622 5622) 68824 (1

2) 3717
3) 1858 . 1
5) 619 -
123

5
20
24

.411
3

2

791
82

2) 791
3) 395 1-1
4) 131 - 2-4 395
32 - 3 - 14 790.

582.

2) 3717
3) 1858. 1
5) 619 - 2
123 24/27

2) 4507.
7) 2253 - 1
321 12/13

4) 791
131.
32.3-3

3) 13853
5) 4617 - 1 1-3
7) 923 - 2 260
131 6 6.31

67. 3/10

3) 582
5) 194
34 - 4

12 24) 791 (32.958 1/3
72
71
48
230
216
140
120
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192
0080
72
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3) 503.
4) 167 - 2
41 - 9/11

4) 2497
5) 624 - 1
124 - 16/17

2) 3717 - 1-3 27
3) 1858
5) 929
183 ~~9~~ 24

6) 3717
5) 619 - 3
123 24
27

3) 13853 - 2, 6
5) 4617 10
7) 919 - 2 60
131 -

2
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6 2
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15 30 14
3) 13853 30 46
5) 4617 - 2
7) 919 - 2
131 - 2

2) 3717 - 1 1
3) 1858 - 1 6
5) 619 - 1 30
123 - 4 24

35 14
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3/105

105) 13853 (132 - 98

100

338

315

203

210

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105
98

131 - 98

3) 13853
5) 4617 - 2
7) 923 - 2 = 6 + 2 = 8
131 - 6

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= 98

4) 41837
5) 10459 - 1
9) 2091 · 4
232 · 3

16
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3) 13853
5) 4617 - 2
7) 923 - 2
131 - 6

2
10

2) 87831
3) 43915 - 1
4) 14638 - 1
5) 3659 - 2
6) 731 - 4
121 - 5

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46611

720) 87831 (121.
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1680

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2300) 250475 (108
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473,0000) 5767220 (1
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103,7220

5,0) 876
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5.0) 87.6
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9
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81
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243

6/00) 82/54
13-4.54

6) 8254
1375

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2
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6
720
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5) 295
59

3014
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413

2477
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59) 475776 (8064
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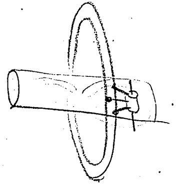
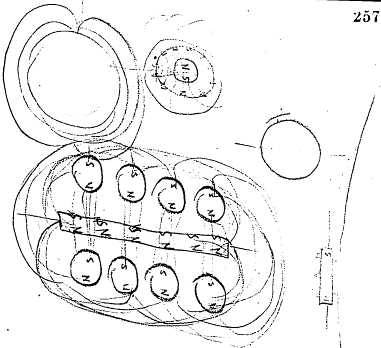
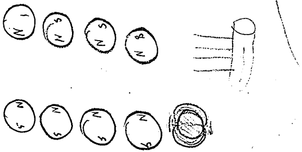
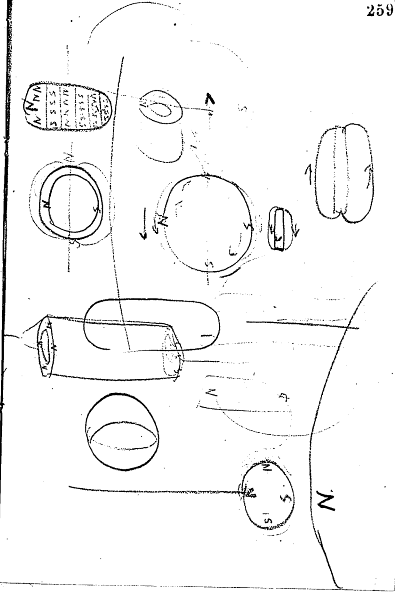








Reasons against an Alternate Current Converter System -

Danger

1st - The pressure on the high tension mains are destructive of life -

2nd Running high pressure mains into stores & houses to connect to converters is dangerous to life.

3rd Converters act as Condensers and notwithstanding two systems (i.e.) high & low are not electrically connected, one may get a several thousand Volt discharge under certain conditions between the low tension system and the ground

4 - Impossibility without danger of repairing high line when Current on.

5 Disruptive action of reverse Currents require heavy insulation

~~To~~ To

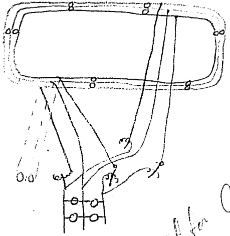
6 ——

7 to get same economy of Conductors
The greatest difference of potential on
on high line + ditto Low line must
be . 3 times greater than with
Continuous Currents, to do what
2000 Volts Continuous will do.
difference of potential of at least 9000
Volts must be used! If on the low
line 2 wire distribution system is
used + 100 volt lamp then 140
mean must be used or difference of
potential of 280 volts alternate?
current If three wire system 560
560 volts difference potential & this
is fatal —
Continuous currents polarize the points
where the Current enters the body +
prevent its passage. — There is no
polarization with alternated
Currents hence full Current passes
+ Kills

8-

As Alternate Current machines must be worked with Continuous or constant field not derived from the main supply circuit, any shortcircuiting of line must burn out machine as it is not saved as in Continuous Current system

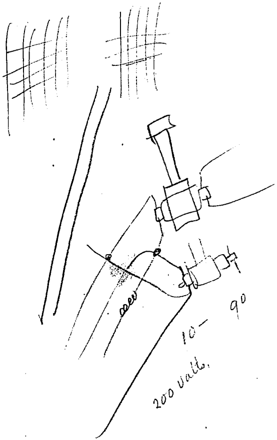
8 The doing away of commutators on Continuous Current machine is no gain as there must be a field energizing dynamo or section on the Alternate Machine & this must have a brush Commutator Experience has shown that small Machines spark worse & give more trouble than big machines —

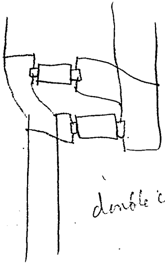


Patent for Connected system

1 | 5000 amp
500

400 | 10 0050 | 25 25 amp
8000
2000
2000



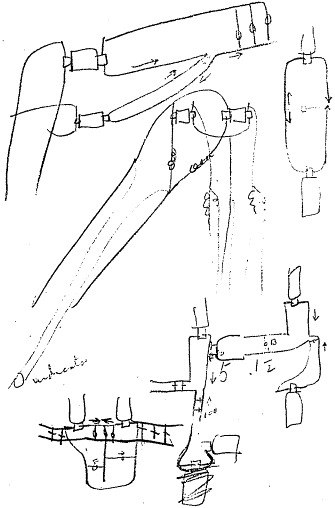


double commutation

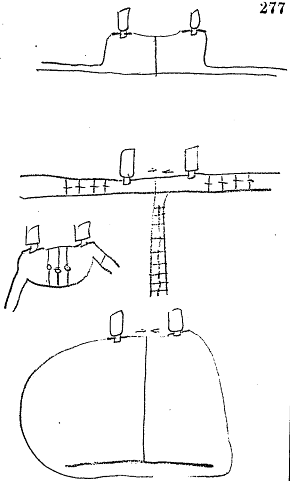
40 volts. 18 volts

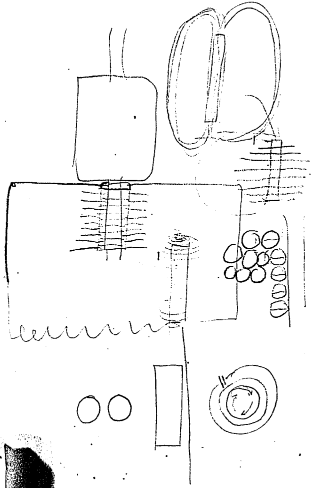
2 pct. 10.

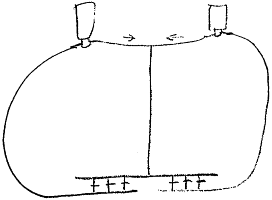
5/.7. 91

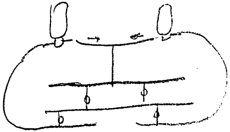


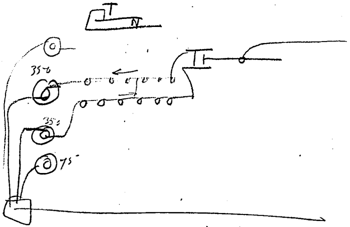
O wheels







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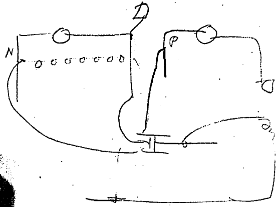
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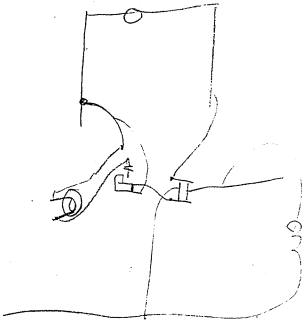

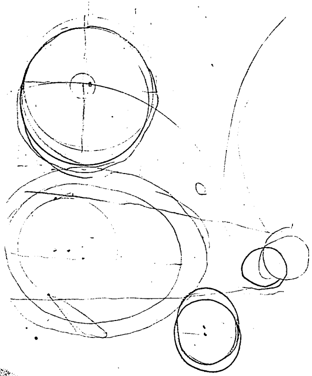

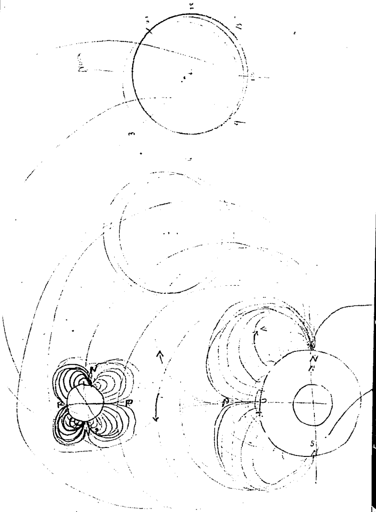
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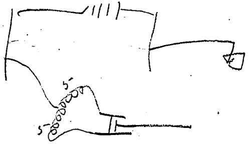

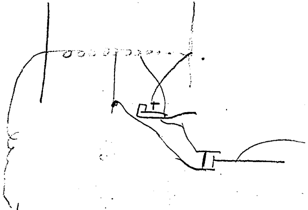

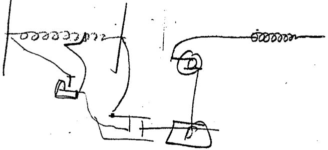

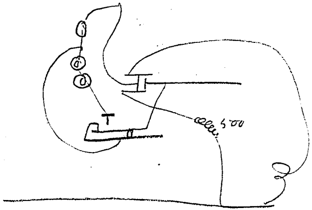
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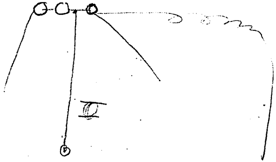

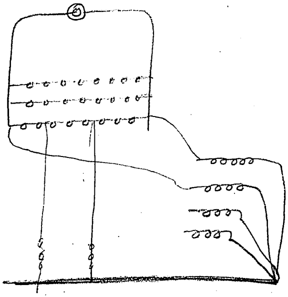

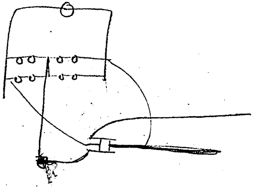

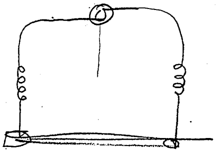

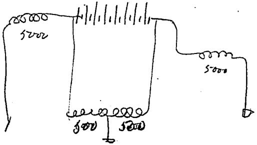
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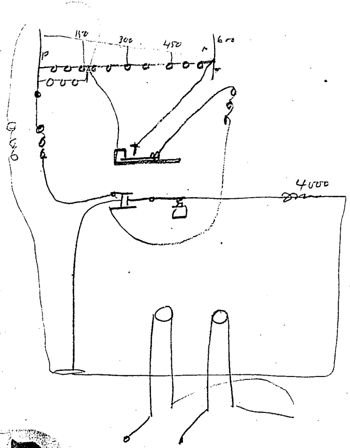
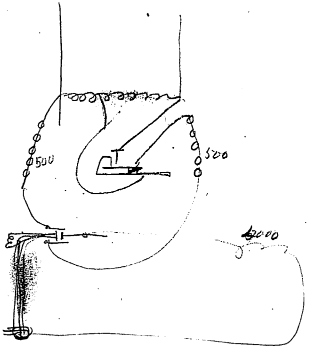

300
450
4000



N-86-04-28

LABORATORY OF
T. A. EDISON,
292 AVENUE B. cor. 17th ST.

I.
N,
292 17th ST.

New York Notebook, N-81-09-13.1

This notebook is undated but was probably used sometime during the 1880s. It is the first of two books containing notes about arc and incandescent lighting patents issued to various inventors between 1879 and 1881. Included are copies of patent drawings, along with notations of the filing and issue dates of the patents. Some of the entries also contain cross references to the claims recorded in Notebook N-81-09-13.2. There are 166 numbered pages preceded by an index.

Blank pages not filmed: 18-19, 22-23, 26-27, 30-31, 36-39, 82-83.

R. R. Moffatt and S. Chichester
Brooklyn N.Y.

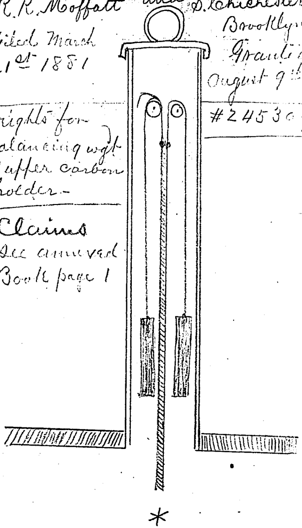
Filed March 21st 1881

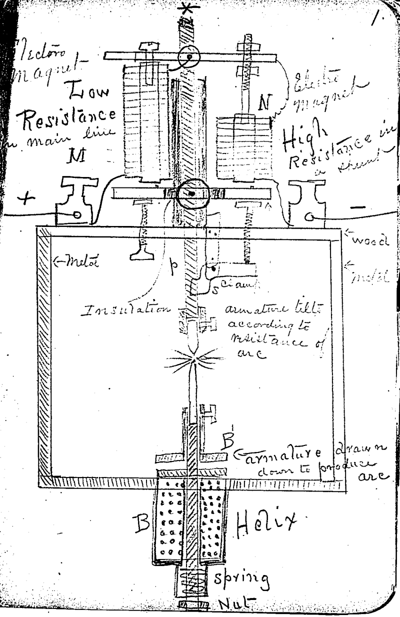
Granted August 9th 1881

#245309

weights for balancing wgt of upper carbon holder -

Claims
See annexed Book page 1

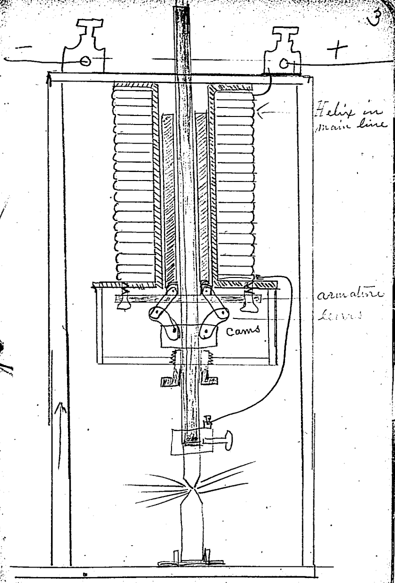




2) Knowles - Brooklyn N.Y.
246957 - Filed June 14th 1881
Granted Sept 13th 1881

Claims - see annexed

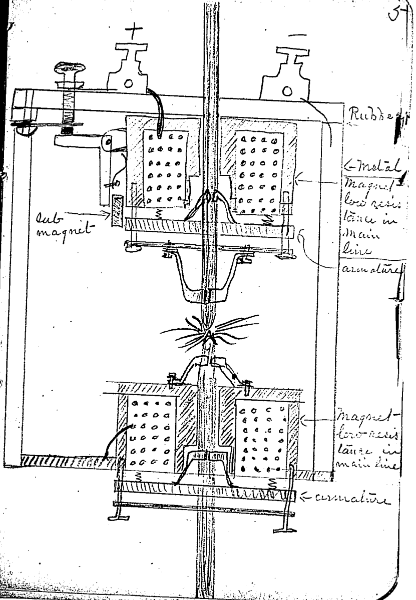
Book page 3



4) J. J & T. J. McTighe Pittsburgh Pa.
Filed April 18th 1881
Granted Aug 23rd 1881
#246178

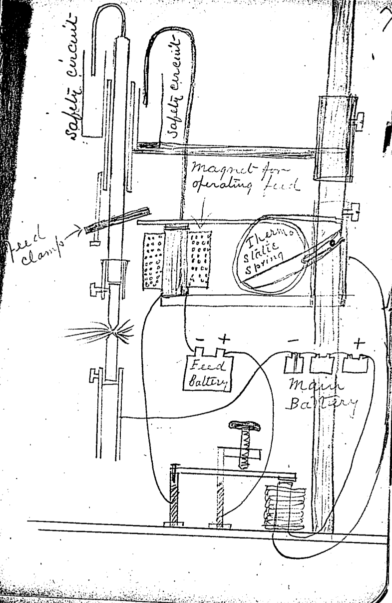
To produce the arc the upper armature is drawn up twice as much as the lower one.

Claims - see annexed book page 5



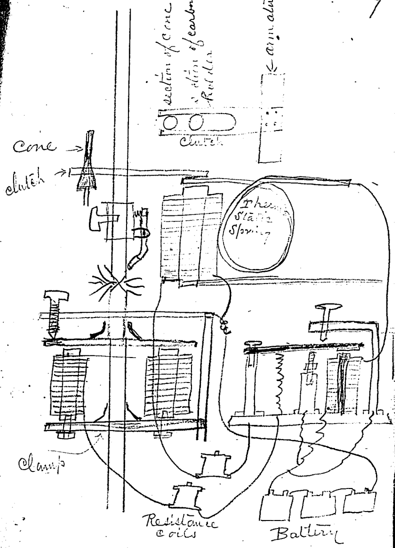
6) Levison Brooklyn N.Y.
227025-
Filed Nov 26th 1879
Granted April 27th 1880

Claims see annexed book page 8



8) Levison Brooklyn N.Y.
239811
Filed August 25th 1880
Granted April 5th 1881

Claims see annexed Book page 11



10.) "Wooley" Mendon Mich

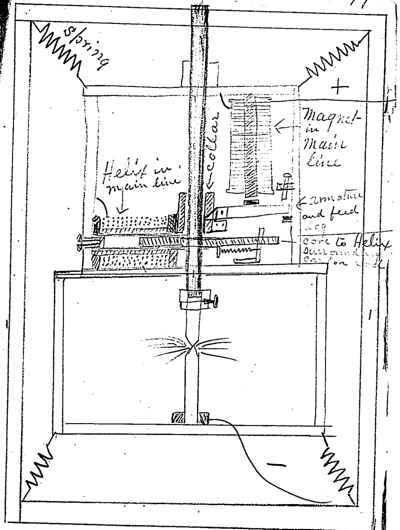
\# 241112

Filed Nov 24th 1880

Granted May 3rd 1881

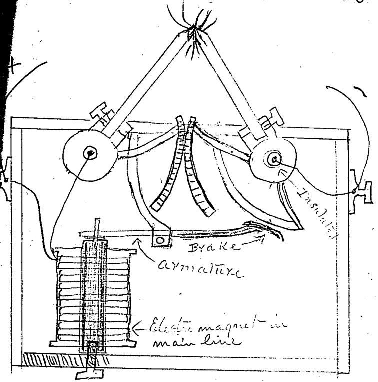
Claims see annexed

Book page 14



Best "Montreal Car"
245933
Filed March 9th 1881
Granted Augt 23 1881

Claims see annexed Book page 16



14) Wood Brooklyn N.Y.

\# 233589

Filed July 19th 1880

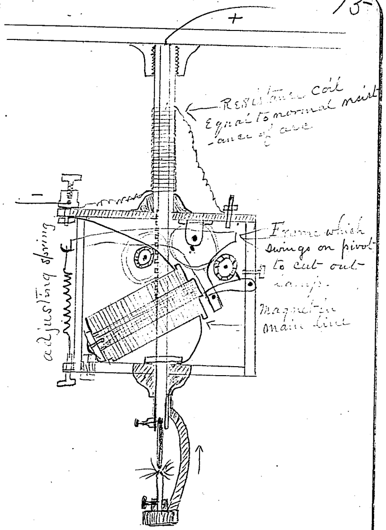
Granted Oct 19th 1880

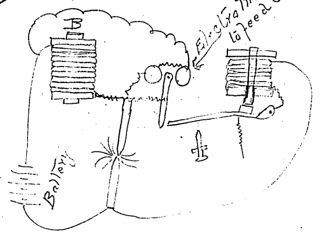
Says essence of invention is the cut out -

Claims are annexed

Book page 18

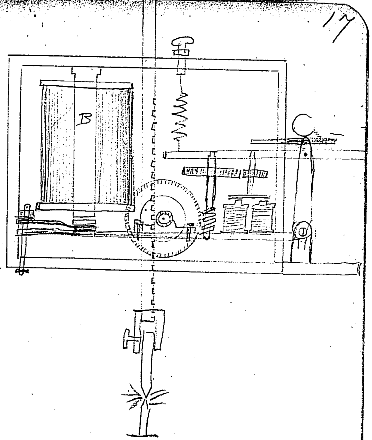
15





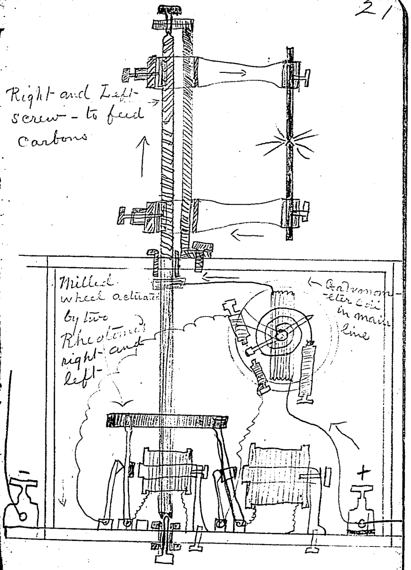
Haskins Newyork
237271
Filed Dec 4th 1880
Granted Feb 1st 1881

Claims - see annexed Book
page 20



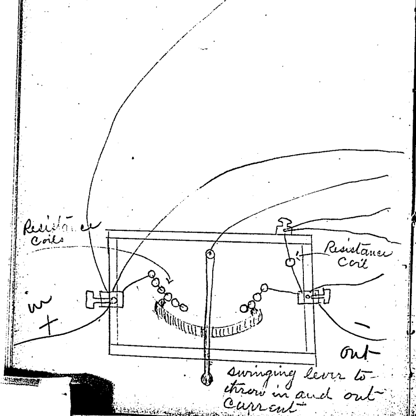
20 / Smithers Brooklyn N.Y.
\# 240781
Filed May 21st 1880
Granted April 26th 1881

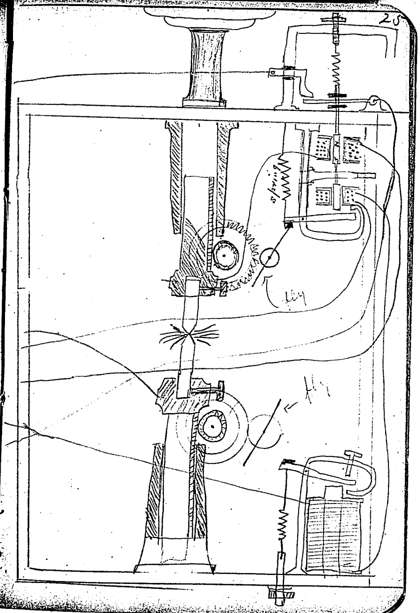
Claims see page 23
annexed book



Bernstein - Newyork
243196
Filed Feb 25th 1881
Granted June 21st 1881

Claims see annexed
book page 27

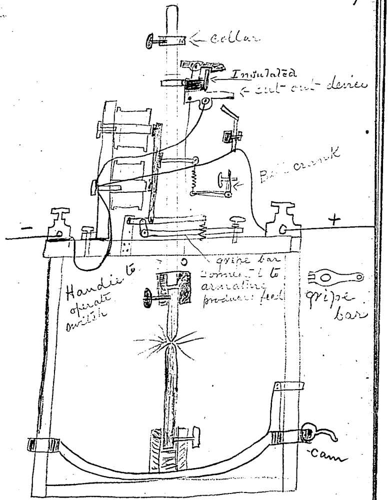




 Hill. Boston Mass
#246390
Filed April 30th 1881
Granted Augt 30th 1881

Westons Lamp - with Hills improvements —

Claims see annexed book
page 30

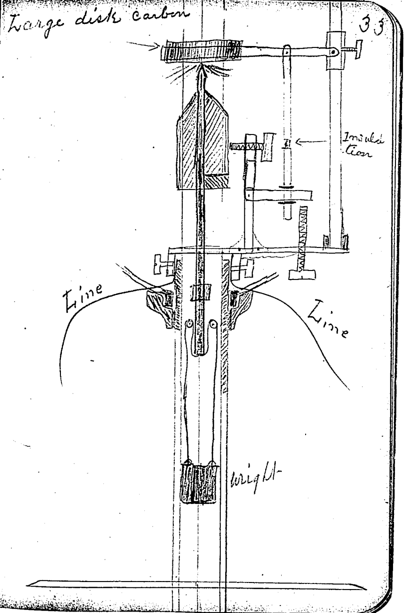


32) Werderman London Eng
240795
Filed June 30th 1880
Granted April 26th 1881

Patented in England June 21st 1878 and June 10th 1879

A small pencil of carbon kept just in contact with large disk of carbon by gravity feed

Claims - see annexed Book page 33

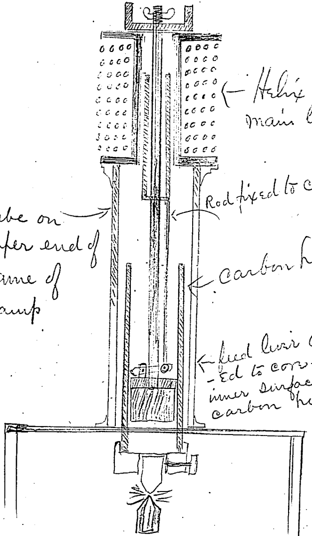


34 Wooley Mendon Mich
243748
Filed Feb 24th 1881
Granted July 5th 1881

No wire connections shown in specification - Drawings simply to illustrate feed device -

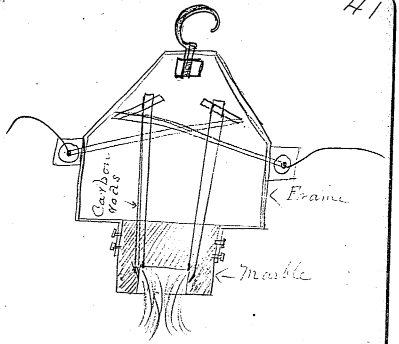
Claims - see annexed book page 36

35



40) Bureau - Ghent - Belgium
#242747
Filed May 27th 1880
Granted June 14th 1881

Claims see annexed book page 39



42) Keith - New York

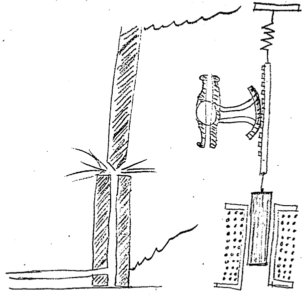
\# 246517

Filed Dec 2nd 1878

Granted Aug 30th 1881

Object is to feed arc lamps with combustible gases & vapors to compensate for waste by electric action —

Claims see annexed book page



44) Keith - Newyork

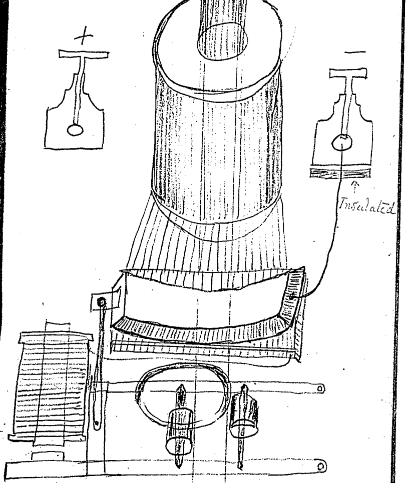
#242137

Filed May 7th 1880

Granted May 31st 1881

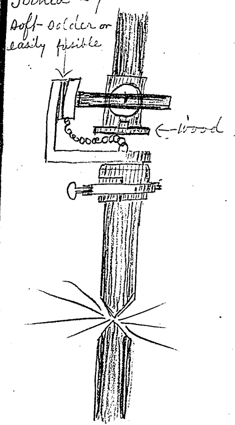
Shows no Connections = but says can be Connected up in any suitable way -

Claims see annexed book page 40



46) Wooley - Mendon Mich
243749
Filed Febry 16th 1881
Granted July 5th 1881

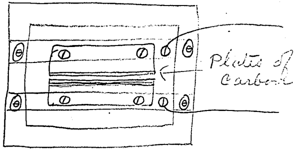
Object is to prevent lamp or generator being injured when carbons are consumed (by short circuit)
Claims see annexed book page 43

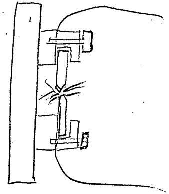


48 Wallace Ansonia Conn
#198436
Filed November 14th 1877
Granted December 18th 1877

Claims see annexed book
page 46

49





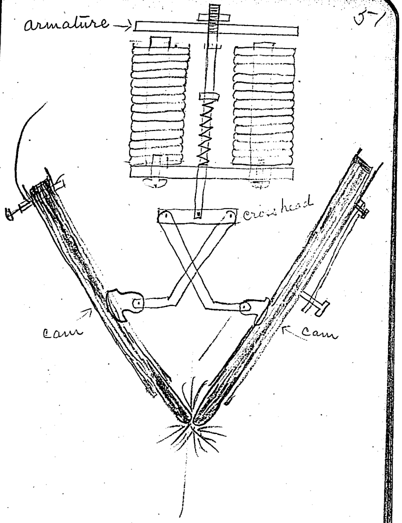
50 King Ansonia Conn

200545

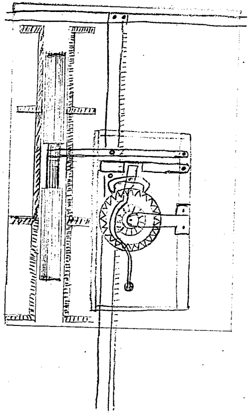
Filed Jan 3rd 1878

Granted Feb 19th 1878

Claims see annexed book page 47



Nr. 9

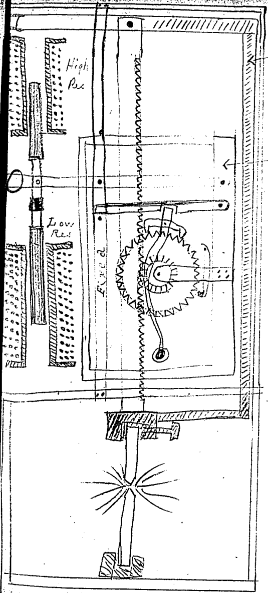


54) Altenick Berlin Ger
243341
Filed Sept 16th 1879
Granted July 21st 1881
Patented in England Dec 4th 1878

The coil of high resistance is in an external circuit -

The coil of low resistance is in circuit with carbons

Claims see annexed book page 48



 Alteneck # 243341.

Modifications of above Patent

Fig 1

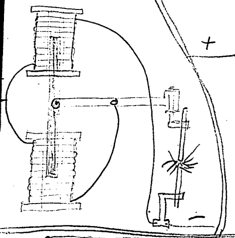


Fig 2

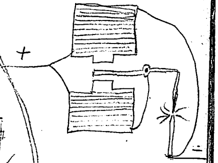
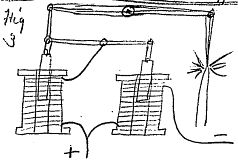


Fig 3



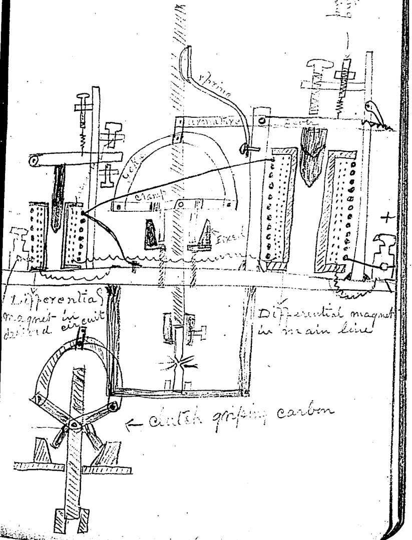
 Weston = Newark N.J

240210

Filed July 8th 1879

Granted April 12th 1881

Claims see annexed book page 50



60) Brush Cleveland

\# 203411

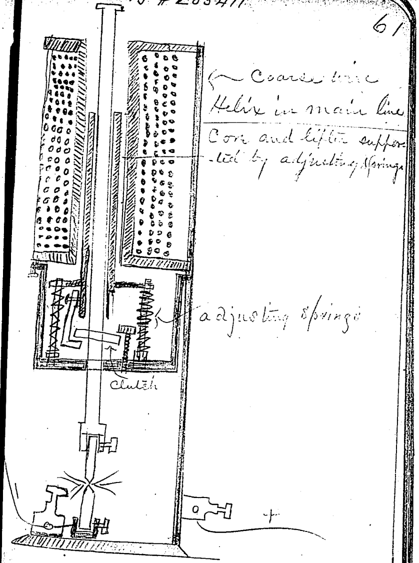
Filed Sept 28th 1877

Granted May 7th 1878

Claims see annexed book page 55

B # 203411

61



Brush

203411

Filed Sept 28th 1877

Granted May 7 1878

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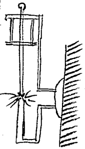
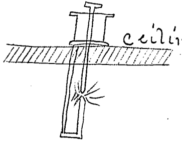
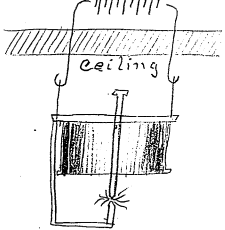
modifications of above Patent







64 Brush

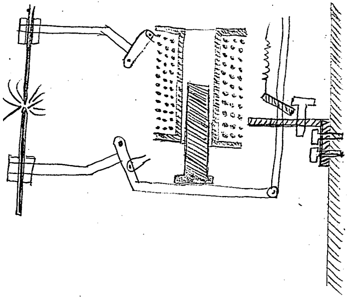
#203411

Filed Sept 28th 1877

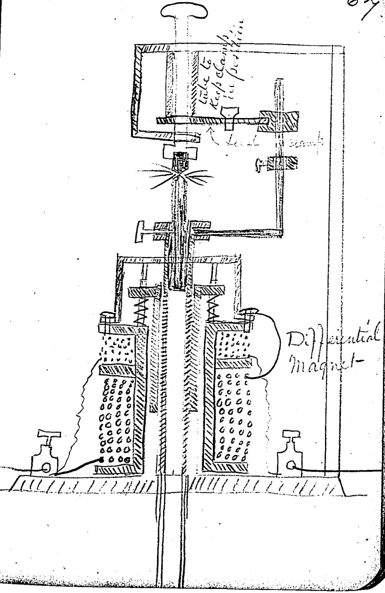
Granted May 7th 1878

Modification of above Patent applied to a lamp that moves both carbons

65



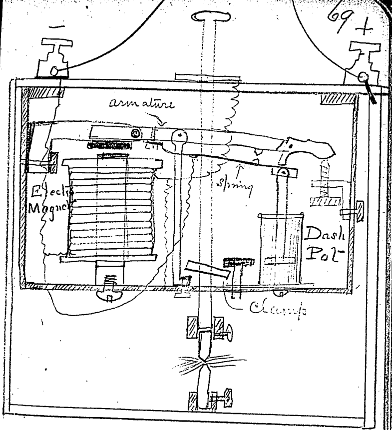
66) Brush Cleveland Ohio
\# 212183
Filed May 7th 1878
Granted Feby 11th 1879
claims see annexed book
page 57



68) Brush Cleveland Ohio
\# 219213
Filed Oct 24th 1878
Granted Sept 2nd 1879

claims - see annexed book page 60

69



Brush Cleveland ①

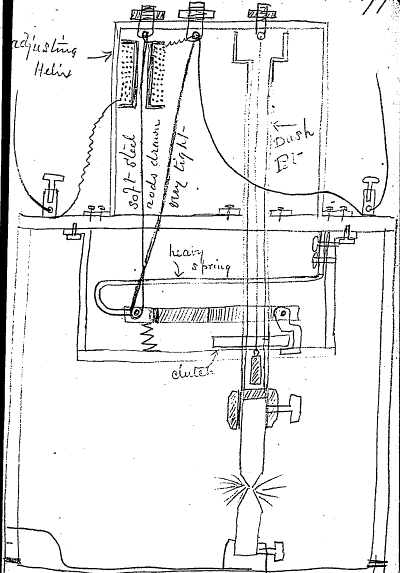
\# 219209

Filed May 16th 1879

Granted Sept 2nd 1879

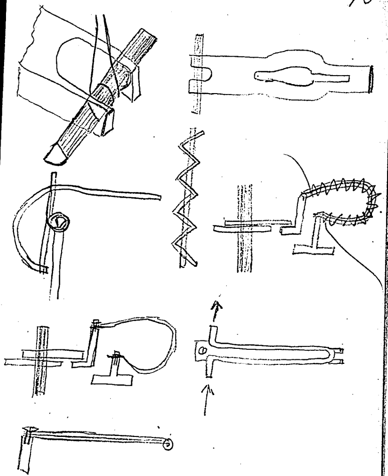
It is the difference in temperature between the two wires and not the actual temperature of the wire outside the helix which determines the working of the apparatus - a difference of 200 degrees being sufficient

Claims see annexed book page 66



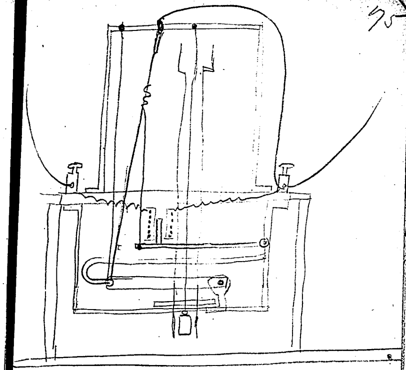
Brush
\# 219209
Filed May 16th 1879
Granted Sept 2 1879

Modifications of above Patent –



74) Brush
#219209
Filed May 16th 1879
Granted Sept 2nd 1879

Modifications of above Patent



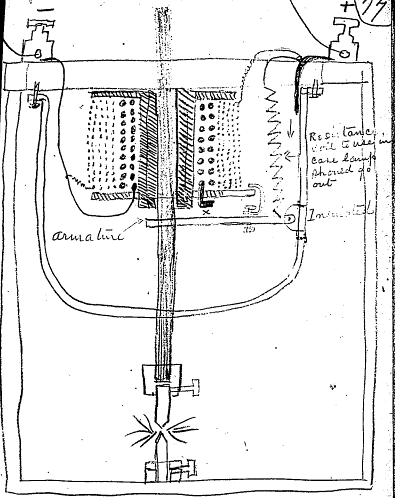
Brush Cleveland O

#219211
Filed July 3rd 1879
Granted Sept 2nd 1879

The coarse wire helix terminates blindly at X - The fine wire helix is always in close circuit with the lamps -

Refers to Lamp #203411 - page 61 - for feed mechanism -
Claims see annexed book page 68

Refers to #203411 for feed

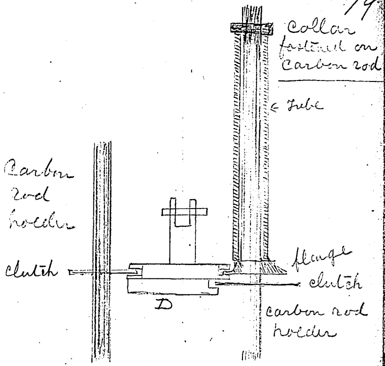


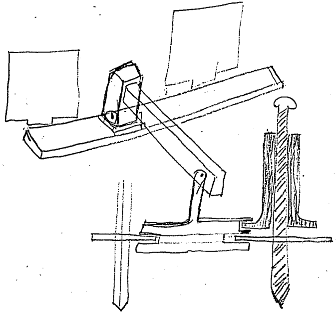
Brush
#219208

Filed May 15th 1879
Granted Sept 2nd 1879

Device for operating two sets carbons dissimultaneously or successively – The mechanism operating this lamp is the same as #203411 – Brush Page 60 this book – with the addition of a double lifting clamp D and a tube surrounding one of the carbon rod holders –

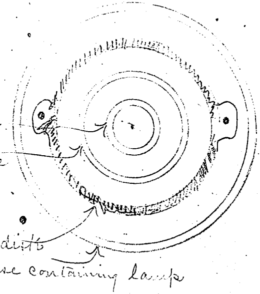
Claims see annexed book page 71

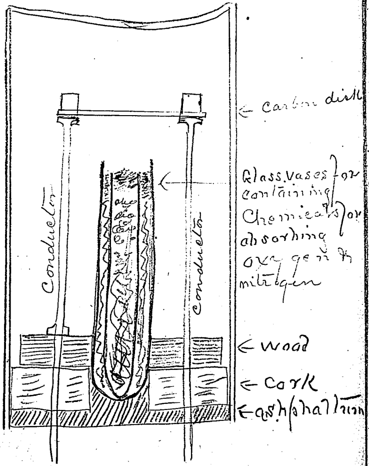




F. Salthe
J. E. Breustter } New York
P. Suey

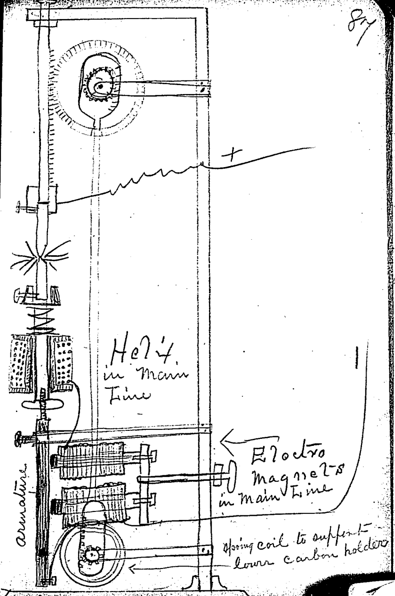
242 051
Filed March 5th 1880
Granted May 24th 1881
claims see page 75
annexed book





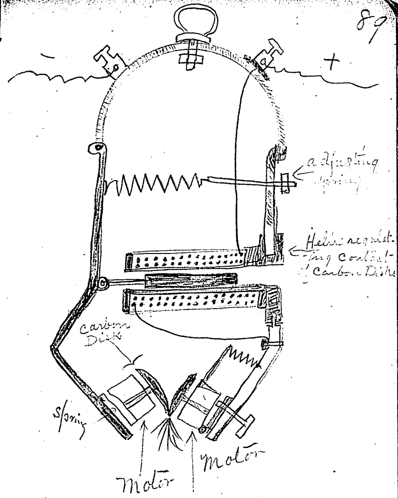
Day Jr Mansfield Ohio
#147827
Filed March 27th 1873
Granted Feb 24th 1874

Claims see annexed book page 97



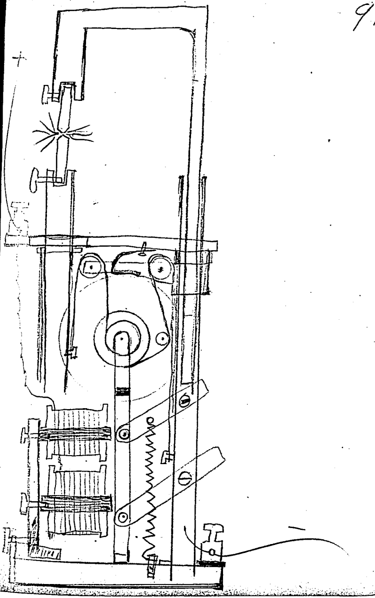
Reynier Paris France
\# 191477
Filed March 29th 1877
Granted May 22nd 1877

Claims see annexed book
book page 79



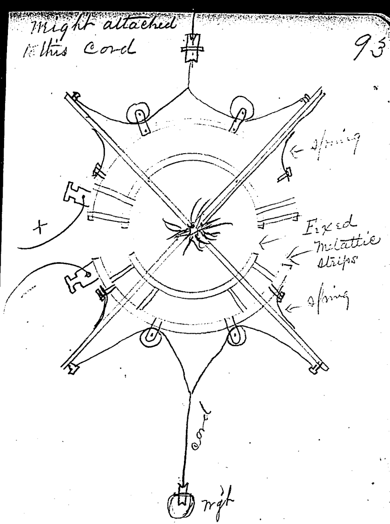
Burgin Basle Switzerland
#206083
Filed April 16th 1878
Granted July 16th 1878

Claims are annexed back
page 80



Rogers Washington D.C.
210213
Filed Oct 24th 1878
Granted Nov 26th 1878

Claims see annexed book
page 82

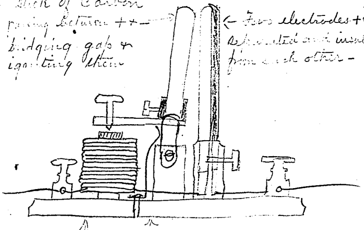


94 / Weston Newark N.J
210380
Filed Nov 4th 1878
Granted Nov 26th 1878

Claims see annexed book page 83

Stick of carbon passing between + + – bridging gap & igniting them

← Two electrodes + + – separated and insulated from each other –

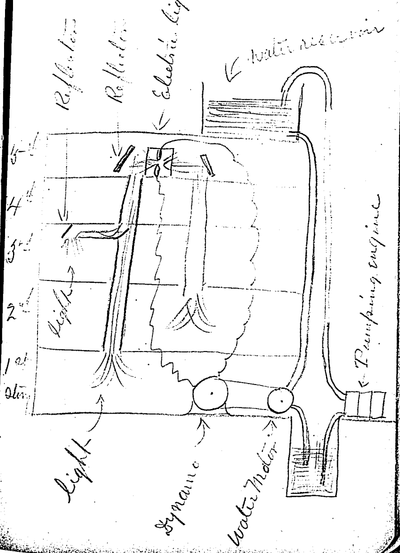


Magnet in main line

Spring pressing stick of carbon between electrodes –

Molera X Cebrian
212040
Filed Sept 21st 1878
Granted Feb 4th 1879

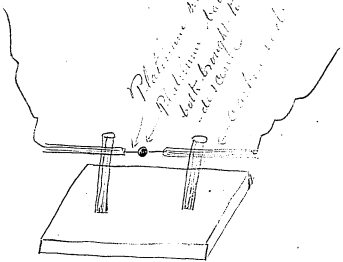
Claims see annexed book page 86



98 Jenkins Washington D.C.
212851
Filed October 22nd 1878
Granted March 4th 1879

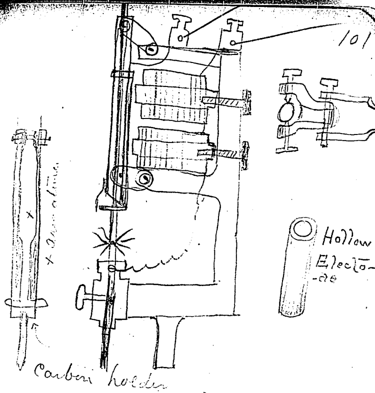
Claims see annexed book
page 87

99



Diehl Elizabeth N/
214242
Filed Jan 25th 1879
Granted April 15th 1879

Claims see annexed book
page 88

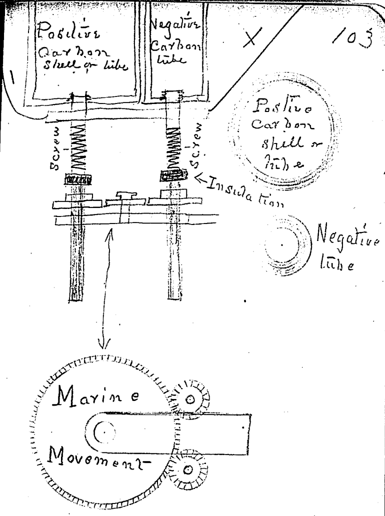


Gilman "Chicago"
215910
Filed Feb 24th 1879
Granted May 27 1879

The positive electrode is a tube about twice the size of negative - are placed nearly in contact rotated by clock work - The screw on each electrode holder - focuses the light & compensates for unequal consumption -
To light - introduce a small conductor between electrodes -

Claims see annexed book page 89

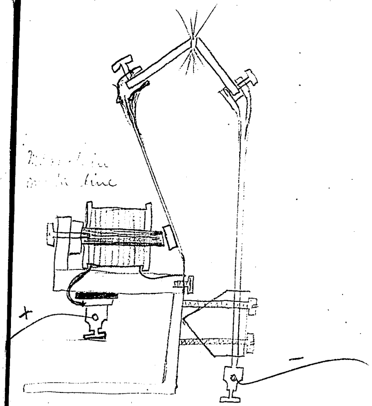
X



Porter St Louis Mo
217744
Filed Jan 20th 1879
Granted. July 22nd 1879

Claims see annexed book page 91

Vibratory



 Gantt Louisville Ky

218958

Filed March 18th 1879

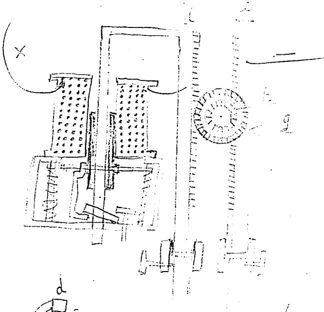
Granted Aug 26th 1879

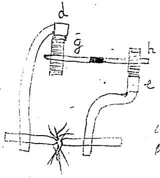
Uses the "Brush" regulator

Object to produce a focusing lamp

claims see annexed

book page 93



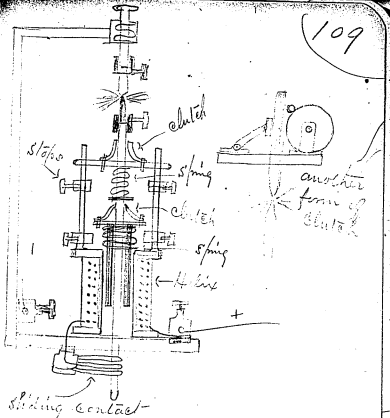


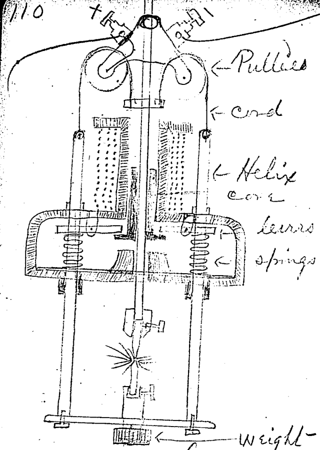
The arms [illegible] from the racks [illegible] are bent in such a way that their [illegible] are brot into a vertical line with ea[illegible]

108 Houston - Thomson
Philadelphia Pa
220287
Filed Jan 23rd 1879
Granted Oct 7th 1879

Claims see annexed book
page 94

109

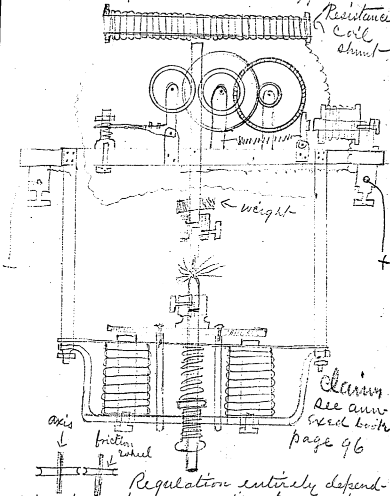




Houston - Thomson
Philadelphia Pa
Modification of #220287

Thomson - Houston Phil^a Pa

#220508 - Filed June 11th 1879.
Granted Oct 14th 1879

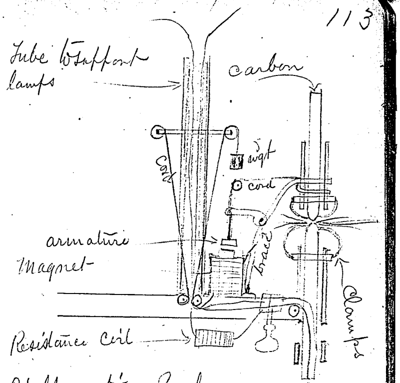


Claim see annexed book page 96

Regulation entirely depend-
-ent upon the magnetic power of a
constant shunt circuit around the arc

Pendleton San Francisco
#220728
Filed March 18th 1879
Granted October 21st 1879

Claims see annexed book page 100.

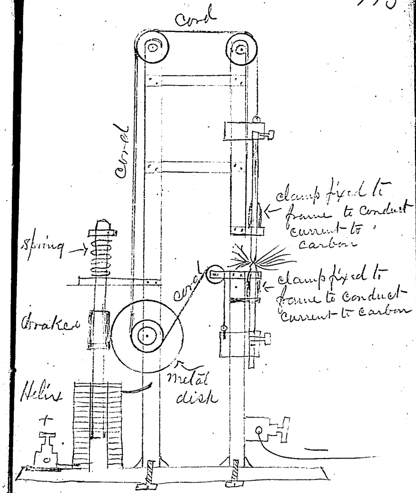


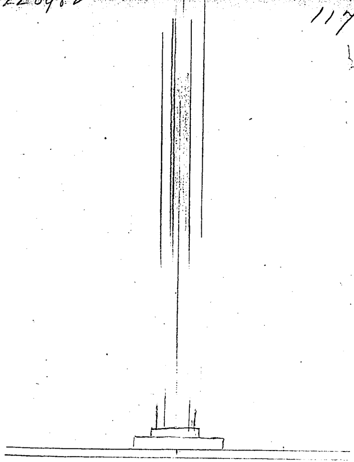
Right section of chandelier

114 Holcombe Newyork
#221918
Filed May 7th 1879
Granted Nov 25th 1879

Claims see annexed book page 101.

115





Kippling Roselle N.J.

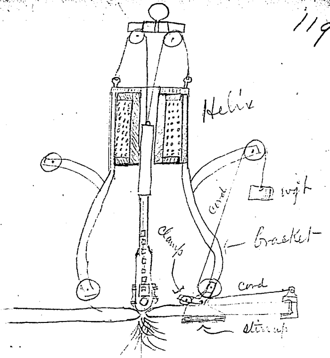
222503

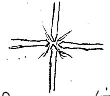
Filed April 18th 1879

Granted Dec 9th 1879

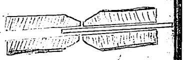
Patd in France Jan 9th 1878

Claims see annexed book page 103





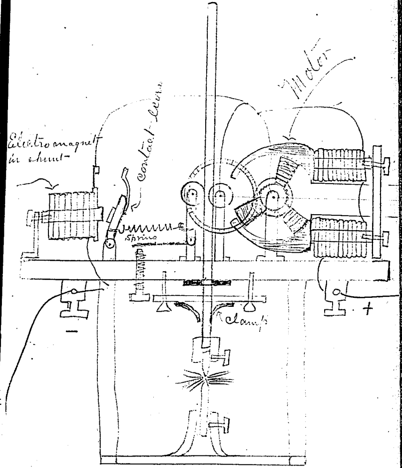
Cross section



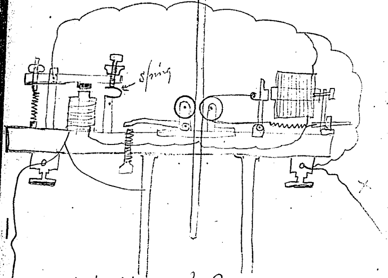
Hollow carbon with loose one inside

120) Houston - Thomson Phila
223646
Filed Nov 24th 1879
Granted Jan 20th 1880

Claims see annexed book page 105



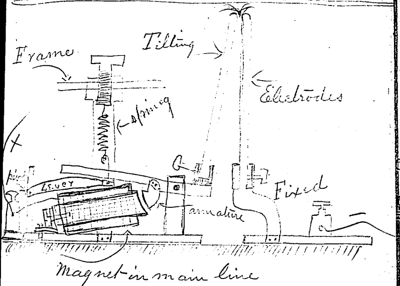
Houston - Thomson
#223646
Phil^a



Modification of Patent #223646

Weston Newark N J

#225312 - Filed Sept 28th 1878
Granted March 9th 1880

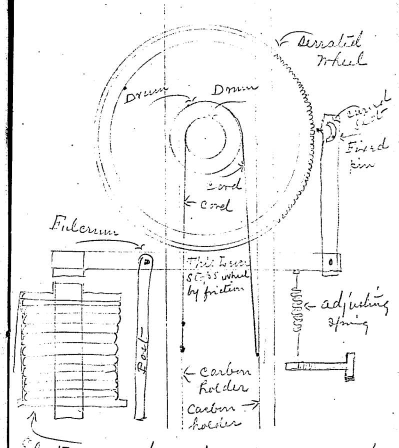


Claims see annexed book page 109

124 Keith Muzanke
#227264
Filed April 22nd 1879
Granted May 4th 1880

Regulator and feed mechanism

Claims see annexed book
page 112



No wire connections given in drawing - No way shown of forming the arc -

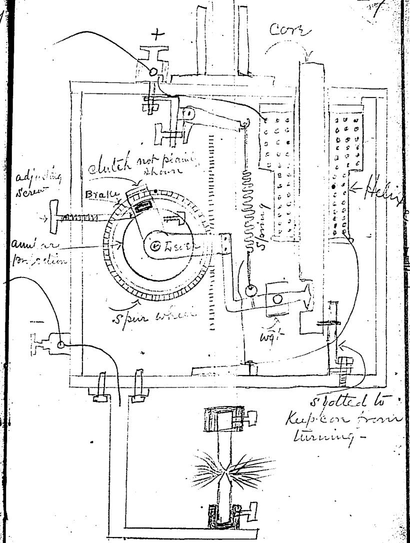
Bramsdorf - Pearl River N.Y.

227478

Filed May 31st 1879

Granted May 11th 1880

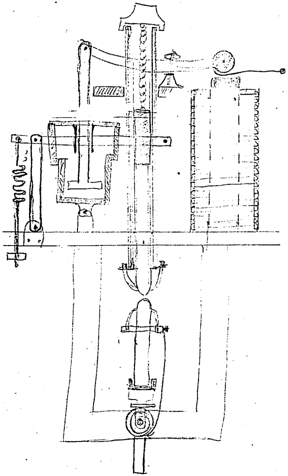
Claims are annexed back page 114



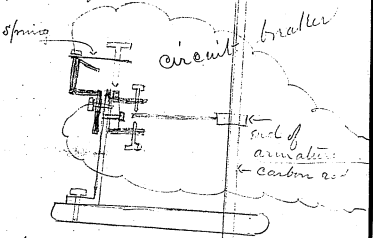
128 Huller - Mackintosh
N.Y. Bkly'n
#229,246
Filed Sept 3rd 1879
Granted June 29th 1880

Claims see annexed book page 116

129

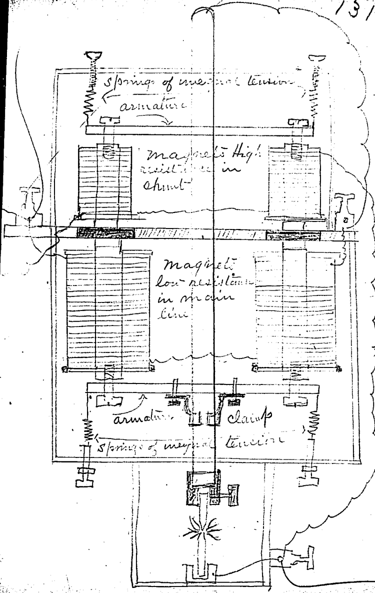


Kellogg - Hyde Park Ill
229536
Filed Nov 20th 1879
Granted July 6th 1880



The springs being of unequal tension allow the armatures to tilt - carrying down the carbon holder - the clamp on lower armature is strong enough to hold weight of carbon - except at the time when the upper armature tilts and carrys down the carbon rod -

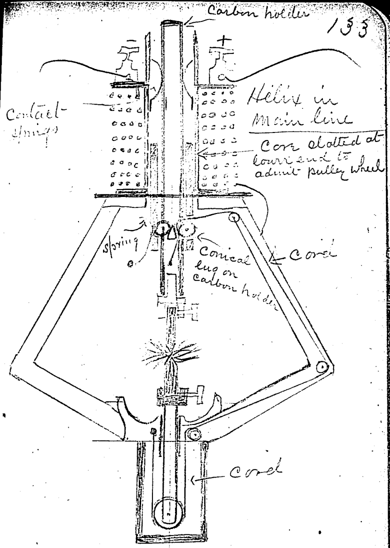
Claims see annexed book page 121



Moffatt Brooklyn
230801
Filed April 26th 1880
Granted Aug 3rd 1880

The lugs are fixed to the sides of core - when core is drawn up the lugs enter between wheels causing them to rotate - by friction producing the arc

Claims see page 126 annexed book



134 Holcombe Granby Conn

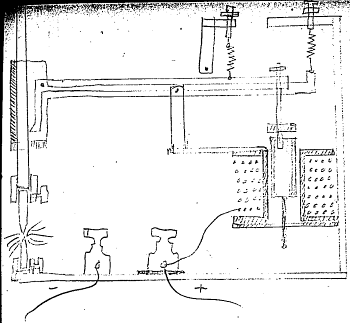
\# 233096

Filed. May 20th 1880

Granted Oct 12th 1880

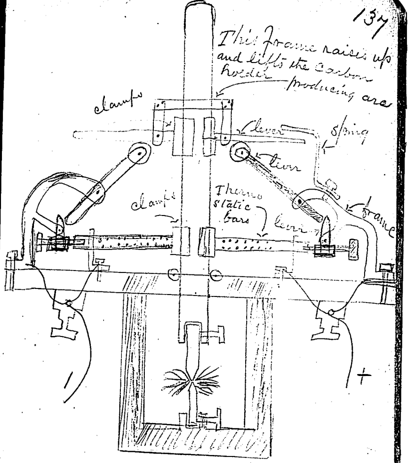
claims see annexed book page 130

135



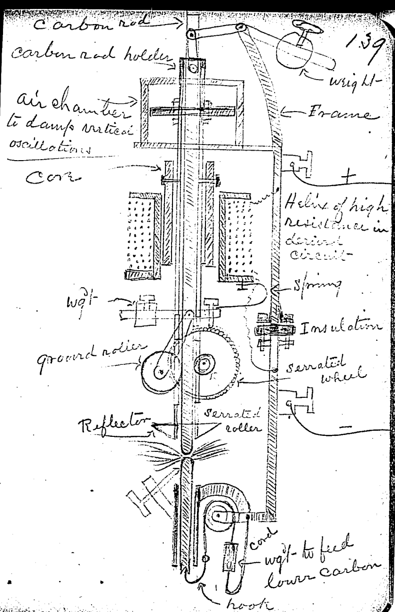
136) Guest Brooklyn N.Y
233236
Filed July 7th 1880
Granted Oct 12th 1880

Claims are annexed
book page 133



Siemens
233289
Filed May 12th 1880
Granted Oct 12th 1880

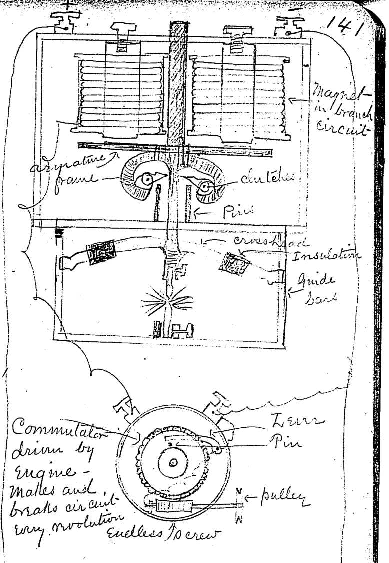
Claims see annexed book page 135



Brockie England
233399
Filed May 21st 1880
Granted Oct 19th 1880

Pat'd in England Sept 19th 1879

Claims see annexed back
page 138

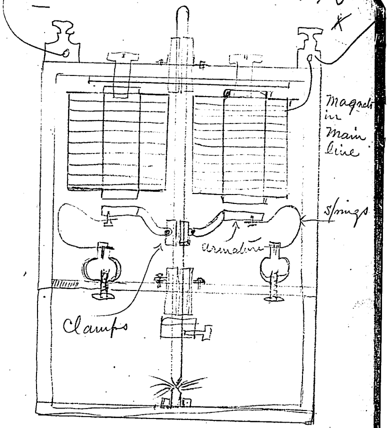


142) Jacobs Toledo ①
233416
Filed July 31st 1880
Granted Oct 19th 1880

Magnets in main line

Claims see annexed book page 140

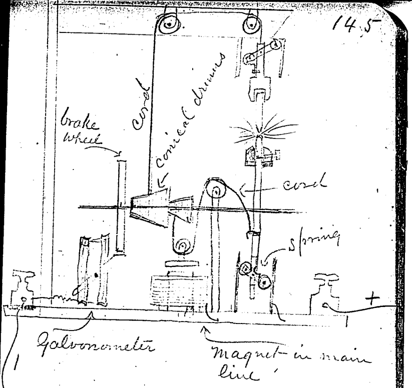
143



Harrison England
234032
Filed May 26th 1880
Granted Nov 2nd 1880

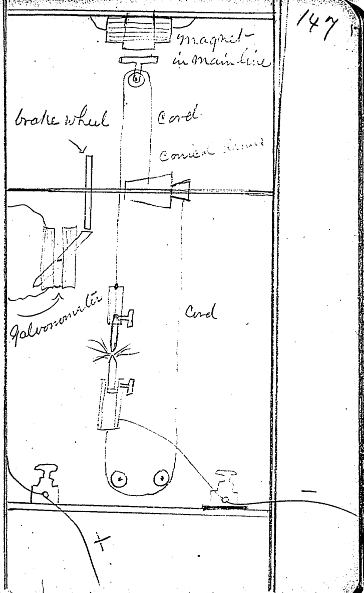
Pat^d in England Sept 25th 1879

Claims see annexed book page 142



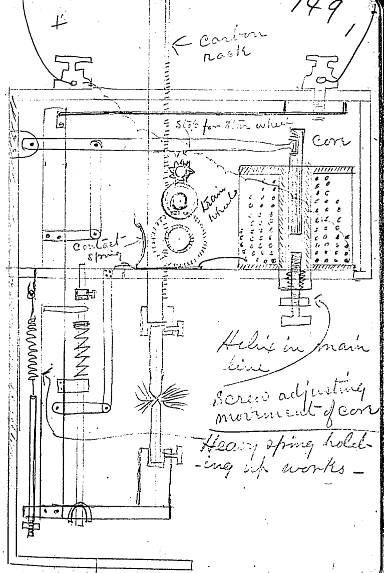
 Harrison England
\# 234032

Modification of above Patent



148 Maxim
#234835
Filed May 4th 1880
Granted Nov 23rd 1880

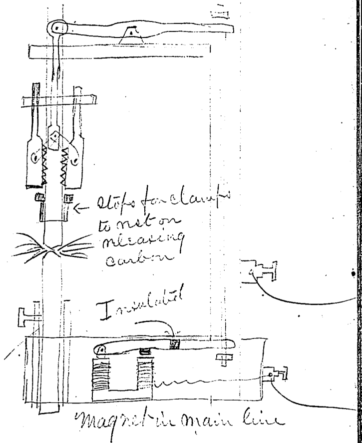
Claims see annexed book
page 143



150 Langley Ann Arbor Mich
235258
Filed July 16th 1880
Granted Dec 7th 1880

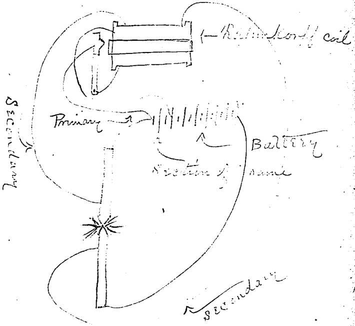
claims see annexed book.
page 146

151



152 Rogers Washington D.C.
216760
Filed Dec 27th 1878
Granted June 24th 1879
claims see armored book
page 148

alternating current



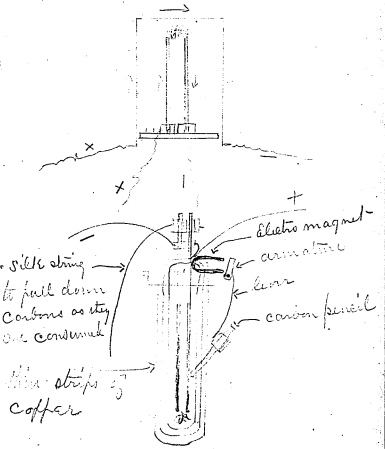
"Jamin Paris France
#218749
Filed July 18th 1879
Granted Aug 19th 1879

The lamp is to be lighted by hand - by inserting a conductor between electrodes -

If the lamp goes out the armature drops down by its own weight carrying lever and producing contact of carbon pencil with Electrodes - this contact may not take place at the points of electrodes - but as the electrodes are small - inventor says will produce heat enough to bridge the gap so the current will pass & thus relight lamp -

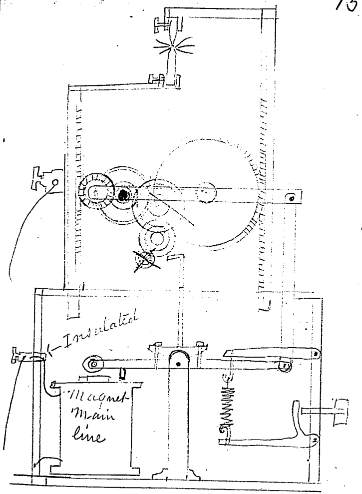
Claims see annexed book page 149

"alternating" Current



 Molyneal Newyork
#123923
Granted Feb 20th 1872

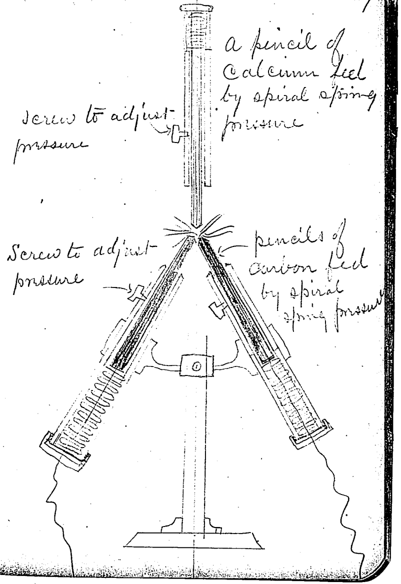
claims see annexed book
page 152



158) McCarthy New York
#220982
Filed March 17th 1879
Granted October 28th 1879

Claims see annexed book
page 153

159

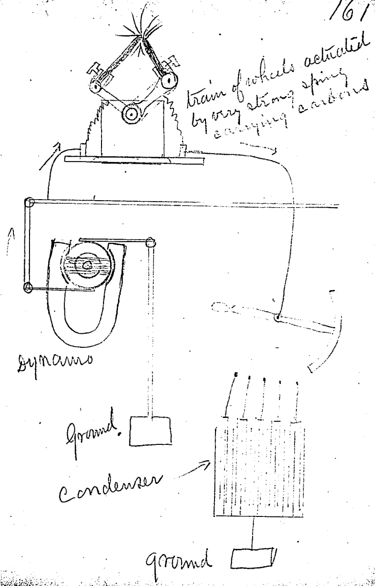


160) Flanery Jackson Miss
223495
Filed Nov 6th 1879
Granted Jan 13th 1880

Train of wheels to be wound up periodically.

Claims see annexed book page 155

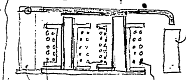
161



Hochhausen #246134
Filed May 23rd 1881
Granted Aug 23rd 1881

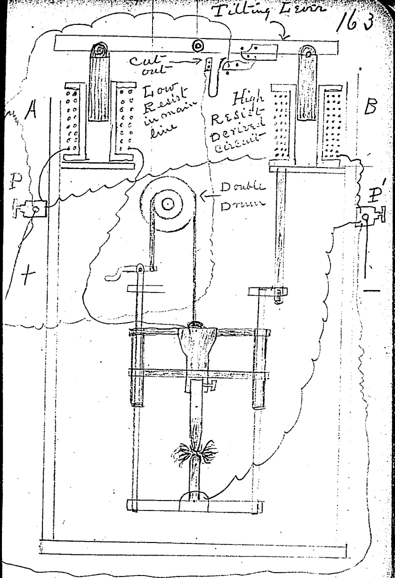
The drawings representing this device are very obscure -

Electro magnet operating cut out



The double drum supporting the electrodes is fixed to the frame of lamps - It is connect-ed to and operated by the tilting lever by means of ratchet wheels detents - catches &c

Claims see annexed book page 163 -



164) Gordon England

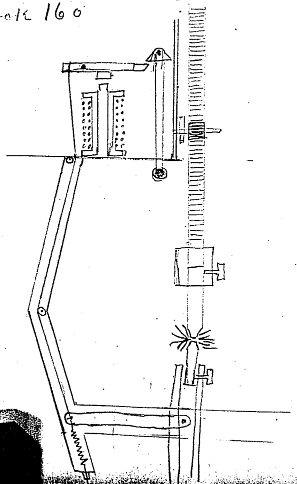
\# 234770

~~Filed Oct 2nd 1880~~

~~Granted Nov 25th 1880~~

Pat^d in England May 4th 1880

Heisler # 239044
Filed May 12th 1880
Granted March 22nd 1881
Claims see page annexed
book 160



New York Notebook, N-81-09-13.2

This notebook is undated but was probably used sometime during the 1880s. It is the second of two books containing notes about arc and incandescent lighting patents issued to various inventors between 1879 and 1881. The entries consist of copies of the claims for those patents previously recorded in Notebook N-81-09-13.1. The book contains 192 numbered pages.

Blank pages not filmed: 170-192.

Moffatt - Chichester
245309

Claims

#1 In an electric lamp the combination of the electro magnets B and M located in the main circuit and the electro magnet N located in a shunt circuit for the purpose of forming and regulating the arc substantially as herein specified.

#2 In an electric lamp, the combination of the electro magnets M and N ~~tilting~~ the tilting armature K.K' the carbon rod p and mechanism to check and regulate the feed of the carbon substantially as herein specified.

#3 In an electric lamp the combination of the electro magnet M located in the main circuit and the electro magnet N located in a shunt

circuit said magnets hav-
-ing poles of like nature ac-
-ting upon the same armature
substantially as and for the
purpose specified -

#4 In an Electric Lamp the
Combination of the Electro
magnets M and N the tilting
armature K K' the carbon
rod p and the lever brake
S Constructed as described so
that the action of magnetic
attraction and repulsion will
act to check and regulate the
feed of the Carbon substantially
as herein specified

Knowles # 246957
Claims

#1
In an electric light a magnet
Connected with a generator of
Electricity in Combination with a
hollow armature core surround-
-ing the upper holding rod and
two compound levers the upper
arms of which are secured to
the armature core the lower
arms having inner cam sha-
-ped ends to form a clutch be-
-ing secured to a sleeve passing
around the carbon holding rod
said levers being alternately tight-
-ened and loosened by the risi-
-ng and falling of the armature
core substantially as set forth -

#2
In an electric light the
combination with a magnet
a hollow armature core car-
-bon holding rod and

Collar L of the levers J.K actuated by the armature core whereby the holding rod is alternately clamped and unclamped as the levers are straightened or bent by the rising and falling of the armature core substantially as set forth.

#3

In an electric light the combination of an electro magnet a hollow armature core collar L hollow adjusting screw surrounding the carbon holding rod and two compound levers substantially as and for the purpose set forth

#4

The combination of the magnet A hollow core D rod B collar L and compound levers J.K as set forth.

McTighe #246178
Claims

1st

In an electric lamp in combination with the carbon feeding helix and carbons an independent conductor around said helix and carbons ~~provided~~ with an electro magnetic cut off substantially as described whereby the said independent conductor is automatically opened or cut upon the passage of a current and closed by a cessation of current.

2nd In an electric lamp ~~in combination with the carbon feeding helix~~ an electrical helix of substantially no resistance in circuit with the electrodes in combination with two conductors of substantially no resistance connected respectively to the main line on opposite sides of the helix and electrode circuit a spring circuit closer constructed and adapted to normally close said conductors together and an electro magnetic ~~dev~~ device constructed and adapted to open said circuit closer upon the passage of a current substantially as described —

3rd In an electric lamp having an electro magnetic device feeding the positive carbon downwardly the combination therewith of an independent electro magnetic device arranged and adapted to feed the negative carbon upwardly at substantially half the speed of ~~desc~~ descent of the positive carbon —

4th

The combination of hollow tubular magnet D.E in the carbon circuit disk armature F convergent spring clutches c frame G and carbon H said magnet D E having a shouldered recess for the reception of the clutches c substantially as described —

5th

The combination of magnet D E in the carbon circuit with sub-armature M lever L spring k contacts g K and plate or conductor f connected to post B said contact g being in direct circuit with post C substantially as described.

Levison #227025

Claims

1st

In an electric lamp the combination of an electro magnet the clamping plate (or the equivalent device hereinbefore described and shown in Fig 3) and a spring acting to support the armature of the electro magnet and the carbon holder -

2nd

In an electric lamp the combination of an electro magnet a compound spring or bar composed of two metals of unequal expansability and acting to support the clamping plate (or equivalent device hereinbefore described and shown in Fig 3) the armature of said electro magnet and the carbon holder -

#3

The connection of the compound spring (or the armature attached thereto) with the carbon holder and its case or guide by means of a mercury cup and wire so as to form a second or safety circuit passing from said spring or armature to the carbon holder -

4th

The wire m so arranged that one end may be connected with any point of the compound spring or bar M and the other end may be connected with the return wire of the circuit to regulate the effective length of said compound spring or bar as hereinbefore described -

5th

The connection of the carbon holder and mercury cup attached to its case or guide by means of a wire so as to form a second or safety circuit passing from the carbon holder to its case or guide -

#6th

The combination of a battery independent of the main circuit and electro magnet and its armature and the compound or simple bar or spring. M as and for the purpose described -

Levison #239811

Claims

1st

In an electric lamp the magnet and its armature and the springs for clasping and adjusting the lower carbon the said magnet being in a shunt circuit from the main lighting current and actuated thereby in combination with a break piece as described. a magnet actuated by the main lighting current and its armature said break piece making and breaking the current of the magnet adjusting the lower carbon substantially as herein specified -

2nd

In an electric lamp the combination of a fork and a fixed or adjustable cone acting to support & feed the upper carbon substantially as described -

3rd

In an electric lamp, the combination with a magnet in the arc or light-circuit and its armature, of a brak piece magnets for feeding the upper and lower carbons, connections, and contact points as described whereby the current to the magnet feeding the lower carbon is broken before the current to the magnet for feeding the upper ~~lower~~ carbon is ~~broken~~ made — substantially as specified —

4th In an electric lamp the combination of a magnet its armature and an insulating sping metallic surfaces thereto affixed and two or more contact points whereby said armature may open or close branch circuits to operate the magnets that control the feeding mechanism of the lamp substantially as described —

5th

An electro magnet. its armature an insulating spring provided with contact plates carrying said armature contact points and a three branched connection with an electric source. all arranged substantially as shown and described so that the lighting circuit will not break itself but will be automatically changed in direction & distributed to the carbon points and to magnets operating the feeding mechanism at proper points as set forth —

6th

In an electric lamp, the combination with a carbon holder of a lever, a spring and a clay or porcelain plate constructed as described whereby the porcelain is brot between the carbon points & the circuit broken when the carbon is sufficiently consumed —

Wooley # 241112

Claims

1st In an electric lamp the combination of a polygonal frame & a series of supporting springs which are applied to opposing corners of the frame substantially as shown —

2nd In an electric lamp the combination of the carbon holder E a sliding collar F placed thereon the lever G pivoted upon this collar and provided with an armature G' a device for regulating the distance the outer end of the lever shall rise and the electro magnet H the inner end of the lever forming a clamp for lifting the ~~clamp~~ carbon holder upward substantially as described —

3rd The combination of a carbon holder a sliding collar placed thereon a friction clamp placed for the collar and provided with an armature an electro magnet and a stop whereby as the friction device is raised upward carrying the carbon holder with it the outer end of the friction clamp is arrested by means of a stop so as to release the carbon holder while the friction clamp remains suspended substantially as shown —

4th In an electric lamp the combination of an electrically operated friction clamp for raising the carbon holder and a second electrically operated friction clamp to prevent the carbon holder from descending to rapidly from its own gravity substantially as specified.

5th In an electric lamp the combination of the helix J the perforated armature L and a spring for withdrawing the armature from the helix and from against the side of the carbon holder with a friction clamp device and an electro magnet for operating the same substantially as shown —

Best. #245933
Claims

1st

In an apparatus for electric lighting. the carbons and horizontal rock shafts provided with geared sectors in combination with a friction sector mounted on one of said rock shafts and with means for actuating it substantially as shown and described -

2nd

The combination of the electro magnet the armature lever H provided with flexible insulating piece H'. the support M' and shaft E provided with friction sector K all substantially as described and for the purpose set forth -

3rd In combination with electro magnet C armature lever H provided with the insulated piece H' and with a retractile spring sup- -t M' having means for its

adjustment as described, and the shaft E provided with a friction sector K -

Wood #233589

Claims

1st An electric lamp substantially such as described having the armature or equivalent movable or actuated part of its regulating magnet organized to act as a contact-maker to throw a resistance coil or equivalent conductor equal to the normal arc or thereabout into circuit, when the said part retires fully from the magnet substantially as and for the purpose set forth —

2nd In an electric lamp substantially such as described the combination with the regulating magnet thereof and its armature or equivalent arranged in the general circuit and a conducting stop against which such armature retires of a resistance coil or equivalent conductor having one end in the general circuit and the opposite end connected with said stop

substantially as and for the purpose herein shown and described —

3rd

In an electric lamp a resistance coil wound upon the rod or tube whereby the lamp is suspended substantially as and for the purpose set forth —

Haskins # 237271

Claims

1st

The combination with the carbon holders in an electric lamp of mechanism for gradually moving the carbon holder a swinging frame for such mechanism an armature electro magnet and a spring that is compressed by the action of the armature and electro magnet substantially as set forth –

2nd The combination with the carbon holders in an electric lamp of an electro magnet to draw one carbon from the other and establish the arc an electro magnet for a motor placed in a branch circuit leading to the lamp and mechanism operated by the magnetic motor for feeding the carbons substantially as set forth –

#3

The combination in an electric lamp of a carbon holder a magnetic motor and gearing for moving one carbon toward the other a detent for stopping the motor and an electro magnet for withdrawing the detent and allowing the motor to operate substantially as set forth –

4th

The motor magnets the revolving shaft V and arm O in combination with the detent and its electro magnet and mechanism for connecting the motor to the carbon holder for feeding the same and a swinging frame for carrying the motor and an armature and main electro magnet substantially as set forth –

5th In combination with the electrodes in an electric light two electro magnets in branch circuits leading to the light one of which electro magnets acts upon an armature to establish the electric light, the other acting as a motor upon mechanism that feeds the carbon and a third electro magnet in a shunt of high resistance passing around the light and a detent operated upon by such electro magnet to liberate the motor substantially as set forth —

Smithers #. 240,781

Claims

1st

The combination with an electric lamp of a sensitive electro magnetic device arranged in constant circuit with the carbons or luminant part of the lamp and acting by the strengthening or weakening of the deflection or attraction of its movable part to serve as a contact maker and breaker to throw a motor or regulating magnet controlling the regulating mechanism into or out of circuit substantially as herein set forth —

2nd An electric lamp constructed with a galvanometer or equivalent sensitive electro magnetic device having its coil arranged in constant circuit with the luminant part of the lamp and having its needle or movable part acting to make and break an electric circuit which serves to regulate the luminant part of the lamp substantially as herein set forth.

3rd

The combination in an electric lamp of an electro magnetic motor normally out of circuit and arranged to propel the regulating mechanism of the lamp with a circuit-braking and closing device arranged constant-ly in the main or luminal cir-cuit and operated by the variation thereof ~~at~~ to throw the said magnetic motor into or out of circuit sub-stantially as and for the pur-pose herein set forth.

Bernstein #243196

Claims

1st

The combination of an electric lamp placed in the main circuit with sets of resistance coils placed in a branch circuit. ~~of a metallic connection or bridge~~ and with electro regulating appliances placed in a metallic connection or bridge between the main and branch circuits substantially as specified —

2nd The combination of an electric lamp placed in the main circuit of sets of resistance coils placed in the branch circuit of a metallic connection or bridge between the main and branch circuits and of electro magnets and mechanism attached thereto to regulate the distance between the carbons the electro magnets and regulating mechanisms being arranged within the bridge substantially as set forth —

3rd

The combination on an electric lamp and of an electro magnet both placed in the main circuit and sets of resist-ance coils placed in a branch circuit with electro regulating appliances placed in a metallic con-nection or bridge of the main & branch circuits and of a third branch circuit and contact de-vices whereby the lamp and elec-tro magnet are cut out and the current short circuited over the contact devices substantially as described –

4th

In an electric lamp the com-bination with a lamp placed in the main circuit and with electro regulating appliances placed in a metallic connection or bridge be-tween the main and branch circuits of a shunt circuit having a spring acted contact lever and insulated

Stop, and of axial electro magnets the vertically suspended cores of which actuate the shunting lever substantially as set forth –

Hill #246390
Claims

1st

In an electric lamp the combination substantially as herein before set forth of a switch or cut out mechanism and a detent which holds the switch or cut out mechanism open. and is operated by or from the feed rod to release said switch mechanism at the time and in the manner substantially as specified -

2nd

In an electric lamp a switch mechanism consisting of a stationary plate having electric connection with one pole of the lamp a vibratory or movable lever or arm having electric connection with the opposite pole of the lamp and a spring or its equivalent which moves the lever toward the stationary plate. in combination with the feed rod and a detent or catch adapted to

hold the switch lever out of contact with the stationary plate. and operated by or from the feed rod to release said switch lever at the time and in the manner substantially as herein - before set forth -

3rd In Combination with the side rods of the lamp. the globe or shade holding ring having bearing arms K, L the latter formed with two bearings P, P' and provided with a cam I' substantially as and for the purposes shown and described.

4th In an electric lamp a device for in casing the feed rod and its connecting parts consisting of the tubular case O secured to the top plate of the lamp and arranged to enter the opening in the globe as it is ~~arranged~~ raised. and having fitted thereto the flange t arranged to cover the opening in said globe and to move with it when it is raised

Substantially as shown and in the manner described –

5th

In an electric lamp the combination with the moving carbon feed rod of a normally held open switch or cut out mechanism released by the action of said rod at predetermined times substantially as specified and arranged & operating when so released to automatically close and remain closed without reference to the after movements in either direction of the feed rod and a handle whereby said switch mechanism can be re-set in its open position substantially as herein before set forth –

Werdermann #240795

Claims

In an electric lamp or lighting apparatus in which the light is produced between two electrodes substantially as described, the combination with the two electrodes of devices connecting with a swinging or other adjustable holder for one of the electrodes and arranged to be operated thereby, and to control the movement of the lower electrode by lateral pressure thereon substantially as described –

2nd In an electric lamp or lighting apparatus in which the light is produced between two electrodes one of which bears continuously upon the other, the combination with the electrode c and mechanism for feeding the same of the electrode b arranged to bear upon the lower electrode, and connected with devices adapted to au-

-tomatically control the feed of the electrode c substantially as described –

3rd

In an electric lamp or lighting apparatus in which the light is produced between two electrodes substantially as described, the combination of the electrode c with the two part holder i and devices connecting with a swinging holder of the upper electrode and arranged to be operated thereby and to regulate & control the lateral pressure of the two part holder upon the electrode c substantially as described.

4th

The combination with the electrodes b, c in an electric lamp or lighting apparatus of ~~the mechanism~~ pivoted holder for the electrode b the two part

holder i through which the lower electrode c is fed and devices connected with the pivoted holder b^2 and arranged to bear against the hinged part of the holder i substantially as described –

5th

The combination with the two electrodes b, c in an electric lamp or lighting apparatus of a mechanism connected with the pivoted holder of the electrode b and adapted to act against the hinged or movable part of the two part holder i, said mechanism being constructed to automatically establish a short circuit in the apparatus after the electrode b has dropped to a certain extent – substantially as described.

Wooley - # 243748

Claims

1st In an electric lamp the combination of a hollow Carbon holder and a regulating mechanism the moving parts of the mechanism being placed in the carbon holder substantially as shown —

2nd

In an electric lamp the combination of a helix or axial magnet a core a hollow carbon holder and a regulating mechanism the moving parts of which are placed in the holder and operated by the core and helix substantially as described

The combination of the hollow carbon holder a dash or plunger and a regulating mechanism the moving parts of which are placed therein, the distance that the regulating mechanism shall move being controlled by the dash substantially as set forth —

4th In an electric lamp the regulating mechanism or device composed of a frame and a pivoted lever in combination with a core which raises the mechanism and carbon holder upward the carbon holder and helix substantially as described —

5th

In an electric lamp the combination of the tube C having the axial magnet applied to its upper end a hollow carbon holder which forms a dash pot the

the Core N having the rod O fastened to it and a clamping device which is placed in the dash pot and which is operated by the core so that when the core is raised upward the clamp will engage with the inner side of the dash pot & raise the carbon holder upward substantially as shown —

Bureau #242,747

Claims

1st

In an electric lamp the combination with two converging Electrodes arranged to feed by gravity of a block of refractory material provided with converging passages or sockets in which the poles of the electrodes are received and hidden from view the lower face of the block being cut out like a vault for the light, substantially as set forth —

2nd

The Combination of the carbons C with guide block M and conducting rods T turning on centers substantially as and for the purpose described

3rd The combination of the carbons "C". with guide block M inclosed in casing D conducting rods T turning on centers, and suspension frame S substantially as and for the purpose described -

Keith #242137

Claims

1st The combination with the lifting electro magnet of an electric lamp of a resistance coil. loops or connections there-from at various points and a circuit-closer operated by said electro magnet the whole so arranged that as the carbons are separated the divisions of the resistance coil are successively cut out of circuit

2nd The combination with the electro magnet of an electric lamp which serves to separate the carbons to a regulated distance of a resistance coil in the principal or direct circuit

with said electro magnet and a circuit closer which determines the number of coils in circuit all so arranged that as the carbons are separated by the attraction of said electro magnet the total resistance of the coil diminishes -

3rd The combination with the armature of an electro magnet which controls the length of arc in an electric lamp of an artificial resistance loops or wires leading therefrom at graduated points in said resistance and rocking circuit-closer connected to the armature the whole so arranged that as the armature is attracted the rocking circuit-closer makes succession contact with the loops of said resistance so as to cut the divisions thereof successively out of circuit -

4th In combination with the ~~electro~~ regulating electro magnet of an electric lamp which serves to control the length of arc a resistance at another point in the same principal circuit with the arc and circuit closing devices controlled by said regulating ~~magnet~~ electro magnet the whole so arranged that the ~~vt~~ regulating electro magnet operates the circuit closer and diminishes the resistance simultaneously with ~~the~~ its operation in increasing the length of arc substantially as and for the purpose described.

5th The combination with the ~~electro m~~ regulating electro magnet of an electric lamp of the resistance helix A wires B form C and rocking circuit closer D operated by said electro magnet.

6th The combination of the lifting or separating electro magnet of an electric lamp with the rocker D and link K substantially as described —

Woolley #243749

Claims

1st The combination of a stem having a hole through its end and provided with a set-screw, with a carbon or electrode holder made in two parts which are united by a solder or other substance which fuses at a low temperature and a chain for holding the carbon holder when detached from the stem substantially as shown —

2nd In an electric lamp a carbon made in two parts which are connected together by solder or other substance which will fuse at a low temperature, so that in case the holder should become heated the two parts will separate substantially as described —

3rd In an electric lamp the combination of a carbon or electrode holder which is made in two parts and united together by a substance which fuses at a low temperature with a chain which is fastened to both parts substantially as described

4th In an electric lamp the combination of the stem A having a non-conducting substance secured to its lower end with a carbon or electrode holder made in two parts which are secured together by a substance which is fusible at a low temperature

and a chain which is fastened to both parts for the purpose of preventing one of them from falling substantially as and for the purpose shown —

5th A carbon holder or guide composed wholly or partly of metal which fuses at a low temperature substantially as described —

6th

A carbon holder made in two or more parts which are united together by a solder or made wholly of a metal which fuses at a low temperature in combination with a chain or other suitable device for preventing the carbon on its holder from falling substantially as specified —

Wallace #198436

Claim

1st

The herein described electric lamp consisting of a pair of carbons each present-ing an extended edge par-allel to each other combined with means for holding said carbon and connection with the respective poles substan-tially as described —

King #200545

Claims

1st

The two carbons of an electric light arranged diagonally to each and free in their holders combined with mechanism substantially such as described to grasp the said car-bons while the circuit is unbroken but to release them immediately on the breaking and force them to the focusing point independent of their holders substantially as described —

2nd

The combination in an electric light of two carbons arranged diagonally to each other and free in their holders with a hinged focusing guide to automatically come to the focusing point when the circuit is broken and to be turned away as ~~soon~~ as the circuit is made substantially as described.

Alteneck # 243341

Claims

1st

In an electric lamp in com-
-bination with the carbon holders
two solenoids or electro magnets
one of which has a coil of low resis-
-tance forming a part of the
lamp circuit and the other has
a coil of higher resistance form-
-ing a part of a by pass circuit
by the differential action of which
the carbons are adjusted -

2nd The combination of the
regulating stem A carrying the
carbon slide of an electric lamp
with the levers C.C' Cores S and S'
and solenoid coils R and T
substantially as herein described

3rd The combination of the
regulating stem A with carbon
slide S having rack teeth

gearing with a pinion on the
axis of the escapement wheel ~~x~~ r
the pendulum p having a tail m
engaging with a notch in the arm
z and the fixed stud v con-
-structed and operating substan-
-tially as herein described -

Weston #240210

1st

An electro magnet & an armature the opposed parts of which ~~the oppose~~ are respectively in the form of a cone and of a hollow cylinder the armature having a range of motion permitting the cone to enter the hollow cylinder when the armature yields to the attraction of the magnet substantially as and for the purpose described -

2nd An electro magnet having a longitudinally hollow core in combination with a conically pointed movable armature having a range of motion permitting its conical point to enter the tubular pole of the magnet substantially as and for the purpose described -

3rd In combination with an electro magnet provided with a hollow core and a conically pointed movable armature an adjusting device by means of which the range of movement of the bar to which the armature is attached may be adjusted substantially as described

4th

In an electric lamp the combination of a main circuit of small resistance which includes the carbons and the principal coil surrounding the electro magnet with a derived circuit of large resistance which includes a coil wound differentially upon the electro magnet and a circuit adapted to close the derived circuit whenever the resistance in the main circuit is increased to a prescribed amount by the too great separation of the carbons substantially as and for the purpose set forth.

5th In an electric lamp the combination of the carbons with a differential magnet the two oppositely wound coils of which are respectively included in the main circuit which includes the carbons and in a derived circuit whereby the distribution of the current in the two circuits is automatically dependent upon the progress of the combustion of the carbons substantially as described —

6th In an electric lamp in which the force of gravity tends to diminish the distance between the points of the carbons a lever to which at one end a movable carbon is suspended and upon which at the other end an armature is affixed in combination with an electro magnet, the opposed parts of the armature and magnet being respectively conical and tubular whereby the armature has a prescribed range of movement in the magnetic field during the whole of which there is no material variation in the amount of attraction force exerted upon it by the magnet substantially as and for the purpose set forth —

7th The clamp K composed of the pivoted clamping jaws K K respectively linked to the forked end of the rocking armature lever in combination with the vertical sliding rod d as and for the purpose set forth —

8th The clamp K composed of the pivoted jaws K K the armature lever and links connecting the same in combination with a stop adapted to disengage the jaws K K from the movable carbon holder when the same has been dropped to the desired point —

9th The combination in an electric lamp of the vertical sliding carbon holder d the clamp, the clamp K the forked armature lever g to which the clamp is linked and an electro magnet the coils of which are included in the circuit which supplies the lamp substantially as described —

10th

The armature lever g and the upper carbon holder and clamp in combination with the pawl g^3 for holding up the end of the lever carrying the clamp substantially as set forth —

Brush #293411

Claims

1st In an electric lamp the combination with the carbon holder and core, of a clamp surrounding the carbon holder said clamp being independent of the core but adapted to be raised by a lifter secured thereto substantially as set forth —

2nd In an electric lamp the combination of the clamp D and adjustable stop D' or their equivalents by means of which the carbon points are prevented from becoming so far separated as to break the electric current and extinguish the light substantially as specified —

3rd In an electric lamp the combination of the core or armature C the clamp D and adjustable stop D' or their equiv-

-alents whereby the points of the Carbons are separated from each other when an electrical current is established, prevent-ed from separating so far as to break the current and gradually fed together as the carbons are consumed substantially as described —

4th

In combination with the core C one or more sustain-ing springs c substantially as and for the purpose shown —

Brush #212183

Claims

1st The combination in a single circuit of two or more electric lights each of which is provided with an upper carbon point having mech-anism connected therewith for releasing the carbon holder and allowing it to be fed by gravity and a lower carbon holder the position of which is regulated by the resultant force of axial mag-netism caused by the passage of electricity through a helix on the main circuit and a helix on a shunt circuit substantial-ly as set forth —.

2nd In an electric light reg-ulator the combination ~~of~~ with a carbon holder of a mag-net surrounded by two helices one helix located in the main circuit and the other in a shunt circuit, the main and sub-

-sidiary currents passing through said helices in opposite directions substantially as set forth

3rd In an electric light the combination with a mova-ble core supporting a carbon point and upheld by suitable springs of a helix surrounding the core and connected with the main circuit and a super-posed subsidiary helix also surrounding the movable core and connected with a shunt-circuit substantially as set forth—

4th In an electric light the combination with a mova-ble core supporting one of the carbon points and a main and subsidiary helix surround-ing said core and respectively connected with main and shunt circuits and the upper carbon point and suitable

intervening mechanism whereby the upper carbon point is fed downward by the action of the lower carbon point substantially as set forth—

5th In an electric light the combination with the upper and lower carbon points thereof of a helix in the main circuit and a helix in a shunt-circuit both of said helices surrounding a movable core with which one of the carbon points is connected and clamping mechanism con-nected with the upper and low-er carbon points substantially as set forth—

Brush # 219213

Claims

1st

In combination with the carbons or their equivalent of an electric lamp. a device for governing and controlling the carbons in the following manner - to wit - to separate said carbons to ~~the desired~~ a distance required for the desired length length of voltaic arc and to maintain them in a separated relation excepting at momentary intervals of suitable frequency when the said carbons are arbitrarily caused to feed and come into contact with each other by the shunting of a portion or the whole of the electric current from the magnet operating to separate said carbons substantially as and for the purpose specified

2nd

In combination with the carbons or their equivalent of an electric lamp a device for governing and controlling the carbons in the following manner to wit to separate said carbons to a distance required for the desired length of voltaic arc and to maintain them in a separated relation excepting at momentary intervals of suitable frequency when the said carbons are arbitrarily caused to feed and come into contact with each other without an interruption of the passage of the electric current through the carbons by the shunting of a portion or the whole of the electric current from the magnet operating to separate said carbons substantially as shown.

3rd In combination with the carbons or their equivalent of an electric lamp a device for govern

-ing and controlling the carbons in the following manner to wit - to separate the said carbons to a distance required for the desired length of voltaic arc and to maintain them in a separated relation excepting at momentary intervals of suitable frequency when the said carbons are arbitrarily caused to feed & come into contact with each other without interruption of the electric current in the battery or other source of current by the shunting of a portion or the whole of the electric current from the magnet operating to separate said carbons substantially as shown -

4th

An electric lamp wherein the combined clamp and lifting device B' or its equivalent is

directly attached to or in fact is the armature of an electro magnet substantially as shown -

5th In an electric lamp wherein the clamp B' or its equivalent is directly attached to or in fact is the armature of an electro magnet a vertically adjustable floor or rest for said clamp substantially as and for the purpose specified -

6th In an electric lamp wherein the clamp B' or its equivalent is directly attached to or in fact is the armature of an electro magnet a suitable arrangement and device for making said electro magnet adjustable in its position substantially as and for the purpose shown -

7th The contact points or surfaces d.g placed in electrical connection respectively with the positive and negative wires (or other conductors) of a circuit upon which one or more electric lamps are placed in combination with suitable device for occasionally bring-ing said points or surfaces into momentary electrical con-nection for the purpose at the times of said contact or con-nection of permitting the car-bons or illuminating points of said lamp or lamps as con-sumed to feed substantially as shown -

8th In combination with the mechanism of an electric lamp the contact points or surfaces d.g or their equivalent and a suit-able device for effecting an occasi-onal momentary electrical con-nection between said points or surfaces for the purpose at

the times of said connection of permitting the illuminating points or carbons of said lamp as consumed to feed substantially as shown -

9th

The contact points or surfaces d.g consisting of or faced with car-bon substantially as and for the purpose shown -

Brush #219209

Claims

1st In combination with the wires i i' or their equivalent an adjusting helix I or its equivalents through the influence of which the wires i i' are maintained at suitably different temperatures substantially as and for the purposes described —

2nd In an electric lamp wherein the carbon moving apparatus is actuated by the expansive action of heat upon some portion of ~~said~~ apparatus the wires i & i' or their equivalents adapted as required for the varying ~~equivalents~~ conditions for maintaining a continuous and steady light to be differently heated said difference of heating automatically caused and controlled substantially as and for the purposes described —

3rd An electric lamp wherein the separation and government of the carbons are effected by

reason of the difference in temperature between the wires i i' or their equivalent substantially as and for the purposes described —

4th In an electric lamp the combination with a moving carbon ~~holder~~ or its holder of a clamp constructed to grasp and move said carbon or carbon holder and in connection with said clamp suitable mechanism adapted to be set in motion or controlled by the expansive effect of heat generated by the electric current operating the lamp substantially as shown —

5th In an electric lamp the combination with a moving carbon holder of a tube C said tube constituting the body or cylinder and a moving element of the dash pot substantially as shown —

Brush # 219211
Claims
1st
The resistance M or its equivalent in combination with contrivance adapted to shunt the current from an electric lamp when for any reason said lamp shall offer an abnormally great resistance to the passage of the current operating it substantially as and for the purpose shown.

2nd The combination with the electrodes D' E' of an electric lamp and the mechanism separating and governing said electrodes of a suitable shunt or cut off and a resistance M or its equivalent said shunt or cut off adapted automatically to afford a sufficiently free passage for the current independent of the lamp when from any cause said lamp shall offer an abnormally great

resistance to the passage of said current and said ~~current~~ resistance adapted on the union of said electrodes to weaken or break the circuit through said shunt and thus to reestablish the normal flow of current through the electrodes and reproduce the electric light substantially as shown —

3rd In combination with the carbons of an electric lamp and the mechanism operating them an automatic shunt or cut-off device constructed to offer a ~~greater~~ resistance greater than the resistance offered by the said carbons when in contact said shunt or cut-off constructed first to be called into operation to extinguish said lamp whenever from any cause it (the said lamp) shall offer an abnormally great resistance to the passage of the electric current and second to be automatically relieved from said operation upon a reunion of the extinguished electrodes by reason of said electrodes offering a path to the current of a lower resistance than the resistance offered by said shunt or cut-off device substantially as and for the purposes shown —

Brush # 219208

Claims

1st In an electric lamp two or more pairs or sets of carbons in combination with mechanism constructed to separate said pairs dissimultaneously or successively substantially as and for the purpose specified —

2nd In an electric lamp two or more pairs or sets of carbons in combination with mechanism constructed to separate said pairs dissimultaneously or successively and establish the electric light between the members of but one pair (to wit the last pair separated) while the members of the remaining pairs or pairs are maintained in a separated relation substantially as shown —

3rd In an electric lamp having more than one pair or set

of carbons. the combination
with said Carbon sets or pairs
of mechanism constructed to
impart to them in dependent and
dissimultaneous separating and
feeding movements whereby the
electric light will be established
between the members of but one
of said pairs or sets at a time
while the members of the remain-
-ing pair or pairs are maintained
in a separated relation substan-
-tially as shown —

4th In a single electric
lamp two or more pairs or
sets of Carbons all placed in
circuit so that when their mem-
-bers are in contact the current
may pass freely through all
said pairs alike in combination
with mechanism constructed to
separate said pairs dissimulta-
-neously or successively substan-
-tially as and for the purpose shown

5th In an electric lamp
wherein more than one set or
pair of carbons are employed the
lifter D or its equivalent moved
by any suitable means and con-
-structed to act upon said carbons
or carbon holders dissimultaneously
or successively substantially as and
for the purpose shown —

6th In an electric lamp where-
in more than one pair or set of
carbons are employed a clamp C
or its equivalent for each said
pair or set. said clamps C adapt-
-ed to grasp and move said car-
-bons or carbon holders dissim-
-ultaneously or successively sub-
-stantially as and for the pur-
-pose shown —

7th In an electric lamp the
combination with a carbon
holder and the mechanism
moving said carbon holder

of a lifter or support K or its equivalent constructed to operate in compelling said moving mechanism to sustain the weight of the carbon holder after its carbon is sufficiently consumed or removed sub-stantially as and for the pur-pose described —

Salthe - Bornstein - Sury #242051

Claims

1st The combination in an electric lamp of a transparent shell or globe two metallic rod conductors arranged therein. a carbon ring forming the light giving portion and carbon clamps holding the carbon ring between them fitting upon the metallic rod conductors and screw nuts for tightening said clamps upon said rods substantially as and for the purpose specified —

2nd The combination in an elec-tric ~~lamp~~ light, of a closed tran-sparent shell or globe a carbon or other light giving device arran-ged therein and two vases or ves-sels one containing a chemical or chemicals for absorbing oxygen and the other a substance for absor-bing nitrogen placed one within the other and arranged in the shell or globe substantially as specified —

3rd The combination in an electric lamp of a closed trans-parent shell or globe, a carbon or other light giving device arranged therein and a vase or vessel for holding a chemical, also arranged in said shell or globe and having a silvered surface whereby it is made to constitute a reflector substantially as and for the purpose specified —

Day Jr #147827

Claims

1st In an electric light the combination with each electrode holder and one electrical circuit of two or more electrodes substantially as and for the purposes set forth —

2nd The combination with the magnet R of the carbon supporting rod L arranged to act as the armature of the magnet substantially as described and for the purposes set forth —

3rd The combination with the armature or guide rod of the electro magnet M arranged upon the top thereof in the manner and for the purposes set forth —

4th The combination with the motive power of an electric light and the carbon electrodes thereof

of a connecting rod and gear-
-ings imparting simultaneous
motion to both electrodes substan-
-tially as herein set forth —

5th

The combination with the
motive power of an electric light
of a constant and regularly acting
clock movement substantially as
and for the purposes set forth —

Reynier # 191177

Claims

1st The combination in an electric
lamp of the arms B and B' carry-
-ing the carbons with the spring
R' and with the solenoid S conne-
-cted to one arm and the soft
metal bar to the other as set forth

2nd

A carbon disk for an electric
lamp the said disk being formed
of a compound of carbon sugar
and iron filings in about the
proportions described —

Burgin # 206083
Claims

1st

In an electric lamp the com-
-bination of an electro magnet
P.P armature N parallel bars
m m' pivoted to the said armature
and the pulley support Q attached
to said armature whereby when
the said armature is pulled lat-
-erally by the said magnet the
said armature and pulley support
are also lifted by the said magnet
substantially as and for the pur-
-pose described —

2nd The combination with the
magnet P P the armature N
and the bars m m' constructed
and ~~operated~~ operating substantially
as described of the adjusting screw
P' attached to the said magnet
substantially as and for the
purpose described —

3rd The combination with the
vertically moving bars E E' carry-
-ing carbon holders of a magnet
P P an armature N bars m m'
pivoted at one end to said arm-
-ature and at the other end to a
suitable support the spring O wheel
V and pulleys S S' connected with
the armature by a support Q cords
or chains T T' and sleeves l l' l''
all constructed and operating
substantially as and for the
purpose specified —

Rogers #210213

Claims

#1 The combination of an electrode made in two or more sections or points brought into contact with one another at a point opposite the other electrode and within the area of consumption with a motor or feeding power common to them all so that one section cannot be fed faster than the other but will always keep the points even and joined together in the area of consumption –

2nd The combination of A B geared and driven together at O by any suitable device in combination with A' and B' similarly geared and driven together at O' substantially as and for the purposes herein set forth and described –

Weston #210380

Claims

1st In an electric lamp or torch the combination of one or each of the electrodes with a rod or cylinder composed of lime glass or other material the vapor of which is combustible and is of greater conductivity than the vapor of carbon substantially as and for the purpose set forth –

2nd An electric torch composed of two stationary electrodes fixed in relatively parallel positions and respectively connected with the opposite poles of a battery or other source of electricity and having cemented or otherwise attached to the outer side of one or each electrode a rod or cylinder of lime glass or other material the vapor of which is combustible and is of greater conductivity than the vapor of carbon substantially as and for the purpose set forth –

3rd In combination with an electric lamp. Candle. or torch in which the position of the arc is varied by the combustion of the electrodes an automatic igni-ter composed of a movable con-ducting body a sping and an electro magnet the helix of wh-ich is included in the circuit which supplies the current for the arc. the sping operating to move and hold the igniter against or between the points of the electrodes when the arc is extinguished and the electro magnet operating to move and hold the igniter away from the points of the electrodes when the arc is established substantially as described -

4th The combination with the electrode B of an electric lamp or torch the positive electrode A having twice the area of the

negative electrode in cross section and being provided with the longitudin-al groove ff in which is cemented or otherwise secured the stick E of lime glass or other material as and for the purposes set forth -

5th.

Broadly in combination with an electric Candle or torch in which the position of the arc is varied by the combustion of the Electrodes a movable igniter having a variable range of motion automatically gov-erned in its operation by the cur-rent substantially as described -

Molera – Cebrian
#212040

Claim –

In ~~an~~ electric light apparatus the combination with a magneto electric machine and a hydraulic motor for actuating the same of a reservoir located above the ~~same~~ motor and connected therewith by a pipe and a pumping engine adapted to elevate the water that passes through the motor to the reservoir whereby said motor is supplied with a constant fall of water to actuate the magneto electric machine in an unvarying rate of speed and maintain the electric light at any predetermined candle power substantially as set forth –

Jenkins #212851

Claim

A hollow spherical, hemispherical, or spheroidal body made of platinum or other suitable material said body to be brought to incandescence by closing the electrical circuit upon it as and for the purposes herein set forth –

Diehl #214242

Claims

1st A movable carbon holder E consisting of a tube or pipe to which is hinged an armature G with a clamp H attached which alternately clamps and releases the carbon pencil substantially as and for the purpose described —

2nd The movable Carbon pencil holder E hinged to a solid frame A by links $D' D^2$ which are standing in an angular position to the carbon pencil holder E substantially as and for the purpose described —

3rd The movable carbon holder E linked to frame A as shown in combination with the carbon pencil clamp H and the electro magnets M' and M^2 substantially in the manner and for the purpose described —

Gilman #215910

Claims

1st Constructing the electrodes of an electric lamp of carbons of a cylindrical shell shape, having them placed parallel or nearly so and made to rotate on their axes substantially as described —

2nd The combination of the cylindrical shell shaped carbons with their axes so constructed that while they rotate they advance in the direction of their length toward the light at or near the same speed at which the consumption of the carbon is occurring substantially as and for the purposes herein set forth —

3rd The cylindrical shells of carbon rotating together or nearly so with their top edges even at the point where the arc is formed insulated from each other either by a shell of insulating material on their exterior surfaces or by a plate of some refractory insulating material of suitable thickness placed between — substantially as and for the purposes herein set forth —

Porter #217744

Claims

1st The arrangement of a carbon or other electrode upon an arm or holder supported upon a spring in an electric lamp so that the carbon or other electrode may close and break the electrical connection vibrating rapidly and freely while at the same time maintaining a firm electrical connection without motion at the point of attachment to the lamp.

2nd An arrangement of a stationary insulated arm or holder sustaining a carbon plate, pencil or other electrode and a spring permanently fixed at one end and conveying the electric current while supporting an arm or holder and carbon or other electrode and pressing the carbons or other electrodes together in connection with an electro magnet and an armature attached to the movable holder all so placed in a

electric lamp that the cur-
-rent shall cause one of the
Carbons or other electrodes to
vibrate rapidly and produce
the electric light- substantially
as herein set forth and descri-
-bed —

Gantt #218958

Claims

1st An electric lamp having its
sides A B insulated from each other
by the central portion C and
fitted with movable carbon hold-
-ers substantially as described and
shown —

2nd The combination with the in-
-sulated plates A B of an electric
lamp of the insulated shaft f the
sping K pinions g.h racks d.e
and carbon holders b.c arranged
for opperation by the movement of
the regulator rod a substantially
as and for the purpose specified —

3rd In an electric lamp the
carbon holders b.c connected
with the insulated sides A.B
and bent inward to bring the
carbons in line as set forth —

Houston - Thomson

#220287

Claims

1st In an electric lamp the combination of the magnet core M with the platform PP as describ-ed the difference in the range of movement of which on the pass-age of an electrical current is employed through the agency of suitable catches K K' to pro-duce in the manner described a gradual approach of the electro-des on the weakening of the cur-rent —

2nd In an electric lamp the combination one with an-other in the manner substantial-ly as described of the coil C the core M the platform PP the springs S and F suitable catches K, K' and the rod R R for the purpose specified —

3rd In combination with the plat-form PP and the core M

adjustable stops A A and B B limiting the motion of said plat-form and core as described —

4th In an electric lamp the magnet core M and the platform PP connected elastically to one another by a spring F so that on the passage of an electric curr-ent the core M may be free to move after the platform PP which partially accompanies it has been brought to rest by suit-able stops and so that upon the weakening of said current the magnet core M may partially return to its former position before the platform PP begins its return for the purpose specified —

Houston - Thomson
#220508
Claims

1st In an electric lamp the rod R bearing the upper electrode in combination with rollers P P' resting in frictional contact with said rod so arranged that during the fall of said electrode the supporting rod R imparts rotary motion to the rollers P P' which in turn impart motion to the toothed wheel W' or its equivalent substantially as describell and for the purpose specified

2nd In an electric lamp the rod R supporting the upper electrode. prevented from descending by the frictional contact of the rollers P P' which rollers acting in combination with the armature A as described are prevented from rotating when the magnetic attraction upon said

armature is weakened substantially in the manner described.

3rd In an electric lamp friction rollers P P' resting in contact with the rod R supporting the upper electrode the pressure of which contact is adjustable substantially in the manner described so that by the upward or downward movement of said rod rotary motion is imparted to said rollers P P' or their equivalent for the purpose specified -

4th In an electric lamp the combination of an armature A of a shunt magnet K with a train of wheels W W' in such a manner that when the power of the shunt magnet increases the armature acting as an escapement allows rotation of said wheels and when the power of the shunt magnet decreases the armature acts to check such rotation in the manner substantially as described

5th In an electric lamp the combination with the electrode E of the rod R friction rollers P P' or their equivalents wheel W' armature A acting as an escapement to said wheel and shunt magnet K all operating together as a means of regulating and controlling the downward motion or feeding of said electrode in the manner substantially as described –

6th In an electric lamp the combination of the rod R the friction rollers P P' wheel W' armature A and shunt magnet K for the purpose of controlling and regulating the position of the upper electrode E in the manner described

with the armature N N the electro magnet M M for the purpose of effecting the separation of the electrodes and maintaining the electrode E' in a fixed position during the operation of the lamp –

Pendleton #220728

Claims

1st

In an electric light the combination of the upper carbon "a" sliding tube D with points F the cord P armature J the electro magnet B substantially as and for the purposes herein set forth —

2nd In an electric ~~lamp~~ light a key composed of the plate S insulating block V and plates T T'' with the wires A, C connected thereto and the pin H with insulated knob K and plates Z substantially as and for the purpose herein set forth —

Holcombe #221918

3 Claims

1st In an electric light apparatus the combination of the core of an axial electro magnet with the iron disk of the feeding device when said core acts as a brake to the disk by the inductive action of the core thereon substantially as and for the purpose herein before set forth —

2nd The combination of the helix m core n provided with the teeth n' and disk q provided with corresponding teeth on its periphery substantially as herein before set forth —

3rd The core n of the axial magnet m in combination with the spring o projection c^3 on arm c^2 of the frame c' and disk q substantially as herein before set forth —

4th The combination of the guiding and conducting springs d d and f f with the carbons and their carrying blocks b and b' and bars c and e substantially as herein before set forth —

5th In combination with disk g provided with the drums i and j the cords i' j' and the carbons and their carrying blocks b b' and springs d d f f substantially as hereinbefore set forth —

6th In an electric light apparatus in combination with the magnet m or n disk g of the regulating and feeding device springs d d f f and carbons a a' with the switch t whereby light is produced by the arc or incandescence substantially as hereinbefore set forth —

Kipling # 222503
Claims

1st
An electric lamp in which are arranged two crossing pairs of carbons that do not contact with each other the carbons of one pair being pressed against each other at a higher level than and at an angle to those of the other pair as shown and described —

2nd In an electric lamp the mechanism for holding and feeding the carbons consisting of arms E E and G G with their branches I pulleys K L O bent arms P chains M and weights N substantially as shown and described

3rd The hollow carbon Y containing a solid carbon Y' to be fed into the hollow carbon Z as and for the purpose set forth –

4th The combination in an electric lamp of the core B spool B' helix C crosshead D arms E G branches I pulleys K.L.O stirrups W bent-arms P chains M and weights N with carbons Z Z' as shown and described –

Houston – Thomson
223646
Claims

1st
In an electric lamp a shunt electro magnet ~~whose~~ whose current is derived from that traversing the arc provided with an armature adjustable with respect to said magnet and the motion of which armature is employed solely to open and close an electric contact which contact when made or broken serves in connection with suitable mechanism provided therefor to adjust the position of the carbon electrodes substantially as set forth –

2nd In an electric lamp the combination of an electric motor acting to separate the electrodes with a shunt magnet separately acting to open and close an electric contact ~~which con-tact when made or broken~~ the separation of the electrodes by said motor being sustain-ed until by an increase in the arc resistance the power of the shunt magnet is suffi-ciently increased to close the aforesaid electric contact and thereby divert the electric cur-rent from the motor which ceasing to act permits the approach of the carbon electro-des substantially as described –

3rd In an electric lamp an electro magnetic device traversed by a current derived or shunted from that of the carbon elec-trodes the increase or decrea-se in the strength of which makes or breaks an electric contact said contact comp-leting a branch or shunt around an electro magnetic

device traversed by the direct current or a portion thereof which latter electro magnetic device alone adjusts the position of the carbon electrodes during normal operation –

4th In an electric lamp an adjustable spring S the degree of elastic force of which acting in opposition to the magnetic pow-er of a shunt magnet K deter-mines the moment of closing the contacts p q in virtue of an increased power of the shunt magnet due to an increased arc resistance consequent on an increased length of arc –

5th In an electric lamp the separating device M N the inter-vals of action of which are con-trolled by an electric contact the closing and opening of said contact being dependent direct-

-ly upon variations in the power of a shunt electro magnet K whose variations are themselves dependent upon variations in the arc resistance substantially as described —

6th In an electric lamp the rod R supporting an electrode narrowed at r, for the purpose specified —

7th In an electric lamp the combination of the shunt magnet lever L and roller-lever L' so as to relieve the rod R of its support on an abnormal increase in the strength of the shunt magnet substantially as and for the purpose specified —

Weston #225312

Claims

1st Electrodes of prismoidal or cylindrical form placed in nearly parallell positions in the same plane and mounted in tilting holders whereby the electrodes may be progressively tilted as they are consumed and their outer ends maintained in the required proximity —

2nd Electrodes arranged in nearly parallell positions in the same plane and mounted in tilting holders in combination with an electro magnet or magnets & a spiral spring or springs so arranged with reference to the electrode holders that the outer ends of the electrodes are separated when the attractive force of the electro magnet or magnets preponderates over the force of the spring or springs and the outer ends of the electrodes are brought together when the force of the spring or springs preponderate over the attractive force of the magnet or magnets substantially as described —

3rd Two tilting or rocking electrode holders adapted to move in the same plane and geared or connected together in combination with an electro magnet and a spiral spring whereby the forces of such electro magnet and spring act upon one only of the tilting or rocking holders and are transmitted to the other rocking or tilting holder by means of the gearing or other connection of the tilting electrode holders with each other substantially as described —

4th An electro magnet and an armature adapted to swing

across the magnetic field in front of the core of the magnet in combination with a spiral spring and a curved arm or lifter for the purpose of transmitting the force of the spring to the armature carrier with a variable leverage substantially as shown and described —

5th Electrodes arranged in nearly parallel positions in the same plane and mounted one or both of them in a tilting holder or holders and projecting laterally from a vertically placed board or wall substantially as and for the purpose set forth —

6th In an electric lamp provided with laterally projecting electrodes arranged in the same plane one above the other, the larger electrode D arranged above the smaller electrode C substantially as and for the purpose set forth —

Keith #227264
Claims

1st

In lamps or regulators for electric light the combination of a serrated wheel C the lever S and the electro magnet T when used for controlling the feed movements of the carbon pencils substantially as described –

2nd In lamps or regulators for electric light the combination of a serrated wheel C the point F the slot K the pin L and the bar N when used for effecting the movement apart of carbon points or pencils substantially as described –

3rd In electric lights the mode of controlling the feed movements of carbon pencils which consists in alternately freeing and stoping the motion of a serrated wheel by varied pressure of a lever brake upon the serrations of the wheel substantially as described

4th

In electric lights the mode of controlling the movements of mechanisms of Lamps or regulators which consists in using magnetism for varying the pressure of a lever brake upon the periphery of one of the serrated wheels of the mechanism substantially as described –

Braunsdorf #227478

Claims

1st In an electric lamp the lever H provided with the adjustable weight h' and hook h and shoulder h^5 in combination with the armature F^3 and clutch H' as and for the purposes substantially as set forth —

2nd In an electric lamp the clutch H' provided with the arm h^4 in combination with the set screw K^3 stem K^4 and set screw h^6 as and for the purposes substantially as set forth —

3rd In an electric lamp the spur wheel K provided with the annular projection K in combination with the clutch H' lever H armature F^3 and the carbon holder O provided with the rack o as and for the purposes substantially as set forth —

4th In an electric lamp the spur wheel K provided with the annular projection K in combination with the clutch H' as and for the purposes substantially as set forth —

5th In an electric lamp the spur wheel K provided with an annular projection K in combination with the carbon holder O and the clutch H' as and for the purposes substantially as set forth —

6th In an electric lamp the combination with a movable carbon holder and a circular revolving rim connected therewith of a friction dog or clutch arranged and adapted to engage with said rim and a releasing abutment or stop for throwing ~~out~~ the clutch out of contact with the rim substantially as shown and described —

Fuller - Mackintosh
#229246
Claims

1st In an electric lamp or light regulator in combination with an electro magnet an armature attached to or forming a part of a curved automatic fulcrum-adjustable lever so constructed that its bearing surface shall rest and rock upon a supporting table the whole being so arranged as to automatically govern or regulate the current of electricity by varying the ~~current of electricity~~ electrical resistance at the light arc substantially as and for the purpose herein specified —

2nd In an electric lamp or light regulator the combination of an electro magnet an armature connected with or forming a part of a curved automatic fulcrum-adjustable lever with curved portion resting and rocking upon a supporting table and a reciprocating pencil carrier when arranged and opperated substantially as and for the purposes shown and described —

3rd In an electric lamp or light regulator the combination of an electro magnet an armature connected to or forming a part of a curved automatic fulcrum adjusting lever resting and rocking on its curved portion on a supporting table and a reciprocating pencil carrier provided with detaining fingers or their equivalent when arranged and operated substantially as described & shown and for the purposes specified —

4th In an electric lamp or light regulator in combination with an electro magnet and an armature connected with or forming a part

of a curved automatic fulcrum
adjustable lever with a curved
portion resting and rocking on a
supporting table a cylinder X and
piston N for the purpose of preven-
-ting sudden changes in the ~~po-~~
~~-tion~~ position of the parts —

5th In an electric lamp or
light regulator the combination
of an electro magnet an armature
attached to or forming a part of
a curved automatic fulcrum adjust-
-able lever a cylinder piston and
a reciprocating pencil carrier pro-
-vided with detaining fingers or
their equivalent with metallic con-
-nections when arranged and oper-
-ated substantially as described
and for the purposes specified —

6th In combination with a recip-
-rocating pencil carrier a weight
"a" ~~to~~ provided with a dog D arran-
-ged and operated in the manner

described and for the purposes
specified —

7th The springs h h when used to
connect the rocking lever E to the
table F

8th In an electric light lamp or
light regulator the combination
of the barrel T with the spring S
one end of which is attached to the
inside of said barrel and the other
end attached to the arbor around
which said barrel revolves when
operating to elevate the movable car-
-riage W along the rods R thereby
raising the carbon V as it is con-
-sumed at the arc —

9th In an electric lamp or light
regulator the combination of the bar-
-rel T containing the spring S
with one end attached to the
inside of said barrel and the
other end made fast to the arbor

around which said barrel re-
-volves with the movable carriage
W sliding on the rods R and
the metallic ribbon or chain S all
arranged as shown and specified
when operated for the purpose of
keeping the carbon V pressed
against the detaining fingers v.-

10th In an electric lamp or li-
-ght regulator the combination of
the barrel T with the spring S atta-
-ched to the inside of said barrel
and its arbor around which it
revolves with the rods R the
movable carriage W ribbon S
carbon V cap piece r and detain
-ing fingers v when operated for
the purpose of keeping the upper
part of the said carbon in a
fixed position at the light arc
during combustion substantially
as shown and described -

Kellogg #229536

Claims

1st In an electric light regulator
the combination of an electro magnet
in the main or carbon circuit which
acts through suitable intermediate devices
to separate the carbons and is incapa-
-ble of further operation while the car-
-bons continue to burn and an electro
magnet in a shunt of the carbon cir-
-cuit arranged to repel positively
one of the carbons through suitable
intermediate devices for the purpose
of lessening the distance between the
carbons substantially as described -

2nd In an electric light regulator
the combination of a rod carrying one
of the carbons with a friction clutch
acting continuously on the rod with
sufficient force to sustain its weight
when loaded with the carbon an
electro magnet the armature of
which carries said clutch said

magnet bring in the Carbon cir-
-cuit and an electro magnet in a
shunt circuit arranged to act
through suitable intermediate devices
to force the rod longitudinally thr-
-ough its clutch in a direction oppo-
-site to the attractive force of the
magnet the armature of which car-
-ries said clutch —

3rd
In an electric light regulator
the combination of a rod carrying
one of the carbons a friction clamp-
-ing device which holds the rod
where placed, against the force
of gravity acting on it an electro
magnet placed in the circuit of a
shunt to the arc its armature a cl-
-amping device which clamps and
carries the rod forward as the
armature moves toward the poles
of the electro magnet and unclam-
-ps the rod as the armature moves
away from the poles of the mag-
net and a circuit controller which
opens the shunt circuit when the
armature approaches the poles of the
magnet and closes the shunt cir-
-cuit when the armature comes
back against its stops substan-
-tially as set forth —

4th In an electric light regula-
-tor the combination of an electro mag-
-net in the circuit of the arc and the
electric generator its armature which
carries one of the carbons and estab-
-lishes the arc when the current pass-
-es from the generator to the regula-
-tor a rod carrying one of the car-
-bons a friction clamping device wh-
-ich holds the rod where placed
against the force of gravity acting on it
an electro magnet placed in the circuit
of a shunt to the arc its armature a
clamping device which clamps and
carries the rod forward as the arm-
-ature moves toward the poles of

the magnet and unclamps the rod as the armature moves away from the poles of the magnet or rests against its stops substantially as set forth —

5th

In an electric light regulator the combination of an electro magnet in the circuit of the arc and the electric generator its armature which carries one of the carbons and establishes the arc when the current passes from the generator to the regulator a rod carrying one of the carbons a friction clamp ~~which holds the rod~~-ing device which holds the rod where placed against the force of gravity acting on it. an electro magnet placed in the circuit of a shunt to the arc. its armature. a clamping device which clamps and carries the rod forward as the armature moves toward the poles of the magnet

and unclamps the rod as the armature moves away from the poles of the magnet or rests again-st its stops and a circuit controller which opens the shunt circuit when the armature approaches the poles of the magnet and closes the shunt circuit when the armature comes back against its stops substantially as set forth —

Moffatt #230801

Claims

1st In an electric lamp or regulator a hollow axial magnet core having a longitudinal slot substantially as and for the purposes described —

2nd. In an electric lamp or regulator an axial magnet-core made to actuate a pulley carrying a cord one end of the cord being fastened in the slot or groove of a longitudinally slotted or grooved carbon carrier thus moving the carbon carrier substantially as and for the purpose described —

3rd In an electric lamp or regulator a tube or rod acting as a carbon carrier or holder having a longitudinal slot or groove. substantially as and for the purpose specified

4th In an electric lamp or regulator the hollow axial magnet core A having one or more of the lugs K K substantially as and for the purposes set forth —

5th In an electric lamp or regulator an axial magnet having a hollow magnetic core and a carbon carrier or holder free to move in the core in combination with a cord operating by aid of other mechanism to control the movements of the carbon carrier substantially as & for the purposes set forth —

6th In an electric lamp or regulator a longitudinally slotted or grooved carbon holder or carrier supported & operated within an axial magnet core by a cord substantially as herein described —

7th In an electric lamp or regulator the carbon feeder or carrier O provided with a longitudinally slot or groove in combination with the cord N and a pulley M both of which operate in and through said slot or groove substantially as and for the purpose specified —

8th

In an electric lamp or regulator the lugs K K connected with an axial magnet core when used to effect the separation of carbons, to control the feed of carbons or for both purposes substantially as described —

9th

The combination ~~of~~ consisting of the lugs K K the wheels L L and B B and pulley M arranged substantially as described and illustrated —

10th

In an electric lamp or regulator the combination of the slotted axial magnet core A the slotted carbon carrier O the pulley wheel M and the cord N substantially as and for the purpose specified —

11th In an electric lamp or regulator the combination consisting of the axial magnet core A the carbon carrier O the cord N the carbon carrier R and the pulley P substantially as and for the purpose specified —

Holcombe 233096
Claims

1st

In an electric lighting apparatus the Combination of a small armature with the core of an axial magnet or other moving piece of magnetized metal and feeding device for forming and maintaining an electric arc between the ends of carbon rods substantially in the manner hereinbefore set forth —

2nd In an electric lighting apparatus in the combination the coil e' of an axial magnet lever d and rod g with a clamp or brake for holding the rod g to the lever d and operated by magnetic induction from the core e' substantially as herein before set forth —

3rd In combination the lever d rod g bell crank lever h and

spring K substantially as herein before set forth —

4th In combination the core e' the lever d and rod g with the bell crank lever h provided with the armature i substantially as herein before set forth —

5th In an electric lighting apparatus the core e' and the axial magnet b connected to and operating the carbon rod substantially in the manner described in combination with the armature i arranged to be attracted by the core e' and apply a clamp or brake to arrest the feeding forward of the carbon rod substantially as herein before set forth —

6th In an electric lighting apparatus in combination with the core e' the lever d the rod g the spring o the bell crank lever h the armature i and the spring K substantially as and for the purpose here-in befor set-forth —

7th

In combination the core of the axial magnet the lever d provided with a socket f the bell crank lever h and the armature i adjustably connected to the lever h substantially as and for the purpose hereinbefore set forth —

Guest #233236

Claims

1st The combination in an electric lamp of a thermoscopic rod fitted for lineal expansion by the heat induced by its resistance to the current a lever or levers for multiplying the movement and clamps arranged in connection with the upper carbon to raise the same by movement of the levers all substantially as shown and described —

2nd In electric lamps the expansion rod or rods l levers i, k levers g carrying the clamps f and rod b supporting the upper carbon holder combined for operation substantially as and for the purposes set forth —

3rd In electric lamps the adjustable supporting cap e combined with rod b clamps f and levers g substantially as and for the purposes set forth —

4th In electric lamps the expansion rods fitted for regulating the distance between the carbons and provided with sections of carbon or other material of low conductivity substantially as shown and described

5th In electric lamps the yoke n provided with screws n' plates o and resisting medium p combined with the brackets m and rods l l substantially as and for the purposes set forth —

6th In electric lamps the arm q combined with levers g carbon holder b circuit connections & mechanism for raising levers g substantially as described for the purpose set forth —

Siemens # 233289

Claims

1st

An electric lamp having vertical carbons, the lower carbon pressed upward by a weight against a clamping pressure near its point which yields as the carbon wastes and the upper carbon being held in a tube between roller which when owing to waste of the carbon the tube descends in obedience to automatic regulating apparatus release the carbon and allow it to descend in the tube substantially as herein described —

2nd The method of effecting the automatic regulation of the distance of carbons in an electric lamp by electrically connecting the carbons through a solenoid coil of high resistance having a core which according as it is more or less attracted by the solenoid bears with more or less force on the holder of the upper carbon causing it to approach toward or permitting it to recede from the lower carbon substantially as herein described —

3rd — The combination of the high resistance coil E through which the carbons are electrically connected with its core P' the tube C the rollers D and E' the serrated wheel f spring G and its adjustable screw g' for the purpose of automatically feeding the upper carbon and regulating its distance from the lower carbon substantially as herein described —

4th

In an electric lamp the combination of a lower carbon ~~feed~~ fed upward by a weight acting against a clamp near

its point which yields as the carbon wastes, with an upper carbon fed downward and regulated as to distance from the lower carbon by means of a solenoid coil of high resistance through which the carbons are electrically connected and its core acting in combination with a serrated wheel and roller — substantially as herein described —

Brockie #233399
Claims

1st

In electric lamps giving a periodical and well defined feed to the Carbons in addition to and in Combination with a periodical readjustment of the arc in order to eliminate and provide against serious errors or differences in the size of the arc consequent upon the said regular feed the said regular feed being accomplished automatically by a comutator substantially as described and not dependent upon the variation of the current or resistance —

2nd In electric lamps readjusting periodically in accordance with this invention the arrangement of two magnets and rotating wheel

substantially as described and shown in Fig 4 whereby the main or readjusting magnet is short circuited after a certain number of impulses of the second magnet in the branch circuit with the commutator in order that two or more lamps in the same circuit may be readjusted at different times by one commutator and one branch circuit substantially as described —

Jacobs #233416

Claims –

1st In an electric lamp the device consisting of the magnet A armatures b.b sliding rod and carbon holder D springs E and pivoted shoes C for regulating the feed of the upper carbon downward by means of the rod D overcoming by its own weight and momentum the adjusted friction of the shoes C.C substantially as described –

2nd In an electric lamp the springs E E having their elastic thrust both lateral and downward substantially as shown and described for the purposes specified —.

3rd The combination in a regulator for electric lamps of the magnet A armatures b b

and sliding rod D with the adjustable springs E E having both lateral and downward thrust and the pivoted shoes C.C substantially as shown and described for the purposes specified –

Harrison #234032

Claims

1st In an electric light apparatus the combination with the electrodes and their controlling cords of a pair of cones arranged to operate upon the ~~cords~~ two cords substantially in the manner set forth —

2nd The combination in electric lamps of magnetic needle K and brake wheel A substantially as hereinbefore described with the brake L and pinching screw L' whereby the angular position of the needle K for any given resisting force of the brake may be varied as and for the purposes herein specified —

Maxim #234835

Claims —

1st In an electric lamp a gravitating carrier for the upper carbon and a train of gearing controlling its descent in combination with an electro electro magnet and armature lever operating a detent engaging with said gearing and a carrier for the lower carbon suspended from said lever substantially as described

2nd In an electric lamp an electro magnet and mechanism for controlling the feeding of the upper carbon located above the focus in combination with a carrier for the lower carbon movable vertically and connected with the armature lever of said electro magnet substantially as described —

3rd In an electric lamp an electro

magnet controlling the feeding mechanism in combination with a dash pot or controlling chamber fixed to the armature or core of the electro magnet and surrounding its head substantially as described —

4th In an electric lamp the combination of a lower carbon carrier and a globe surrounding the focus with their flat supports for said carrier and globe placed edge edge upon the same side of the focus and in the same vertical plane with it substantially as described —

5th The carbon carrier E in combination with the bar G the link H and flexible strip I substantially as described —

6th The carbon carrier E in combination with the adjustable

spring R the spring V rod T and forked head W substantially as described —

7th The side pieces d d' in combination with the screw b pin g and jaws e substantially as described —

8th The combination of the globe B with the support C and the dog c substantially as described

Langley #235258

Claims

1st In an electric lamp the automatic clutch or tongs composed of the rods E pivoted links O and jaws F arranged to act directly upon the carbon substantially as described —

2nd In an electric lamp the combination with the automatic clutch or tongs composed of rods E pivoted links O and jaws F of the lever D connected with said rods and operated by an electro magnet and the stationary tube A for guiding the carbon ~~substantially~~ substantially as described —

3rd In an electric lamp the combination of the electro magnet M armature R having insulated R' connecting rod P lever D spring X automatic

clutch or tongs E.O.F tube A and carbon stick all constructed arranged and operating substantially as described —

Rogers 216760.

Claim –

The secondary current of a Ruhmkorff coil with or without condenser for establishing and reestablishing the electric arc or light when said arc or light proceeds from a dynamo electric machine or voltaic battery substantially as and for the purpose herein set forth and described –

Gamin 218749

Claims

1st The method herein described of fixing and regulating the position of the electric arc for the production of electric light consisting in exposing the arc to the influence of electric currents parallel or at an angle therewith of magnets or of solenoids substantially as set forth –

2nd The combination with the carbons of an electric light of a directing body circuit magnet or solenoid for regulating and fix the position of the electric arc substantially as described

3rd The combination with a electric lamp of any ordinary or suitab construction of a directing body or circuit composed of a number coil through which the current is sent befor passing through the carbons of the lamp whereby the arc may be retained in position substantially as described

4th The combination of a directing body or circuit with the carbons or conductors of an electric lamp placed near together and parallel the said carbons being separated by the interval desired for the flashing across of the voltaic arc but without the interposition of any separating insulating or conducting material and being also by preference turned downward substantially as described —

5th The combination with the carbons of an electric lamp and a directing body or circuit of means substantially as described for lighting and relighting when ~~the lamp~~ required the lamp by means

of the currents traversing the aforesaid carbons and directing body or current as set forth —

6th The combination in an electric lamp of the carbons an electro magnet a piece of carbon or other conducting material connected with the armature of said magnet and a directing body or circuit substantially as described whereby the voltaic may be established at a point distant from its ultimate position and then carried thereto by the aid of the directing body or circuit as set forth —

Meynial 123923

Claims.

1st The retrograde mechanism actuated by the armature of the electro magnet which carries the stop lever in combination the slides which carry the electrodes substantially as herein shown and described. –

2nd The retrograde lever having two arms of unequal length the longer arm to produce the retrograde movement of the positive electrode and the shorter arm that of the negative electrode so as to compensate for the increased consumption of the positive electrode substantially as set forth –

McCarty 220982

Claims

1st The two long composition candles connected severally to the two poles of a battery in combination with the calcium stick 16 and with the alloy of iridium and platinum substantially as described whereby they may all move forward toward one center as they burn or wear off substantially as and for the purposes specified –

2nd In combination with the composition candles or sticks of an electric light apparatus asbestus tubes surrounding and protecting the upper and free ends of the candles substantially as and for the purposes described –

3rd In an electric light apparatus the combination of two composition candles or carbon sticks conver-

-ging toward each other at their ends a calcium 16 and an alloy of platinum and irid-
-ium 28 relatively disposed as shown and described whereby the ends of the candles abut against the end of the calcium stick substantially as shown and for the purpose set forth. -

Flannery #223495
Claims

1st The described mode of reg-
-ulating the electric current for electriclighting consisting in the arrangement of a condenser of electricity in the circuit of the lights provided with a means for increasing or decreasing the surface or capacity of the conden-
-ser in the circuit substantially as herein set forth

2nd An electric lighting apparat-
-us consisting of a generator of electricity one or more lamps and a condenser of electricity arranged in circuit with each other with a means of increasing or decreasing the surface of the condenser in the cir-
-cuit substantially as herein shown and described

3rd In an electric lighting appar-
-atus a condenser of electricity

arranged in the circuit thereof and formed ~~of~~ ^ing a series of sections provided with a switch whereby more or less of such sections may be thrown into the circuit substantially as and for the purpose herein set forth —

4th The combination ~~of~~ in an electric lighting apparatus of an electric generator one or more lamps a sectional condenser of electricity and one or more switches controlling the circuiting of the sections with the lamp or lamps and the generator substantially as herein shown and described —

5th An electric lamp consisting of a clock movement fitted with radial arms rotated at slow speed by said movement and provided with

sockets on their ends to receive ~~the~~ the carbons the points of which are fed toward each other at an inclination by the rotation of said arms substantially as herein shown and described —

Finney #234261

Claims

#1 In an electric circuit the combination of a galvonometer operated by a leak from the main line through a resistance with a regulator operated by the galvonometer substantially as described

2nd The combination with an electric light or group of lights arranged on a branch from a main electric circuit and operated by a leak therefrom of a galvonometer and a regulator operated thereby each such light or group of lights having an independent regulator and resistance device substantially as described

3rd In an electric lamp the combination of a carbon holder of iron loosely inserted

in a sleeve with the core of an electro magnet entering the sleeve so as to come in contact with the carbon holder substantially as and for the purpose described

Heisler #239044

Claims

1st The combination in a single electric lamp provided with two or more sets of carbons of a mechanism substantially as described the action of which is to allow only one set to be brok into connection for the passage of the electric current and the formation of the voltaic arc the next succeeding set being automatically released by means of an armature to form the voltaic arc on the breakage of the current in the preceding set substantially as and for the purpose set forth -

2nd The combination in an electric lamp having two or more sets of carbons of an escapement lever G or its equivalent and operating magnet I when the same is used to allow one set

of carbons to come together to form the voltaic arc the next succeeding set being automatically released by means of an armature to form the voltaic arc on the breakage of the current in the preceding set substantially as and for the purpose set forth.

3rd In a single electric lamp of the arc type having two or more sets of carbons the lower members of which are by mechanism substantially as described withdrawn or let down simultaneously for the purpose set forth -

4th In an electric lamp having two or more carbons the retarding devices D D' controlled by electro magnet E and provided with escapement flies or spiders g g' in combination with escapement lever G controlled by electro magnet I substantially as & for the purpose set forth —

5th

The combination in an electric lamp of the single electro magnet I and armatures e i with the carbon holder retarding device and mechanism for moving the lower carbon holder substantially as and for the purpose set forth —

Hochhausen 246137

Claims

1st The combination substantially as described of a double winding drum depending chains or cords supporting the upper and lower carriers directly a pivoted lever a gear train mounted on said lever and connected to the double winding drum a stop or detent stationary with relation to the train and main and derived circuit electro magnets for controlling the movements of the lever in the manner set forth —

2nd In an electric light-regulator a depending frame supported from the regulator casing in combination with a weighted block to which the upper carbon is secured and guideways upon the depending frame which embrace and guide the weighted block or carrier which latter is supported by a chain or cord and provided with a clamp for the upper carbon substantially as described –

3rd In an electric light regulator a depending frame supported from the regulator casing and provided with cross arms substantially as described in combination with tubular guides attached to the cross arms the lower carbon holder and its supporting rods the latter being adapted to slide in said guides and supporting rods of the lower carbon holder adapted to slide in said guides –

4th The combination substantially as described of a weighted block or carrier for the upper carbon a guide frame for said block bracket or cross arms [at]tached to said frame and

provided with guiding devices and a lower carbon holder adapted to be guided by said devices as set forth –

5th The combination of guide frame H h cross arms f and tubular guides g substantially as described –

6th The combination of guide frame H. h cross arms f tubes g guide f' for the carbon pencil substantially as described –

7th The combination of the weighted block to which is clamped the upper carbon the guide ways therefor the lower carbon holder and its supporting rods and the tubular guides attached to the frame work which guides the upper carbon carrier substantially as described –

8th In an electric lamp a ~~saf~~ safety cut out apparatus comprising a circuit closer upon ~~th~~ the lever of the regulator adapted to make and break a safety or branch circuit an electro magnet in the safety or branch circuit and a second circuit closer controlled by a second electro magnet and adapted to make contact and preserve the continuity of the safety circuit when the circuit closer upon the regulator lever has broken contact all substantially as described

9th The combination with the armature lever of the regulator of a cut out circuit closer composed of two pivoted latches one upon the lever and the other attached to the frame of the lamp and adapted to be thrown into contact with a circuit

closing spring and stops for said latches arranged as described to prevent the swinging of the latches in one direction but to allow them to swing freely in the other —

10th

The combination of the pivoted latches the circuit closing spring the electro magnet and its circuit closer and circuits arranged substantially as described

11th The combination of a pivoted yielding locking detent for the regulator and a stationary adjustable support for said detent substantially as described.

12th The combination of a pivoted locking detent consisting of a weighted lever provided with a locking projection a frame or carrier for said detent pivoted on a stationary support and

~~and~~ means of adjusting said frame or support substantially as described —

13th

In an electric light regulator the combination with the axial core of the electro magnet of a block or bar of magnetic material adjustable with relation to said core substantially as and for the purpose described —

FORT MYERS NOTEBOOKS, 1886

These notebooks were generated at Edison's winter home in Fort Myers, Florida, which he constructed shortly before his marriage to Mina Miller in February 1886. The books cover the period March-May 1886. One book also contains entries from May 1887. Most of the entries are by Edison. There are some entries by Mina Miller Edison, whose name also appears in these books as a witness. The notes and drawings deal with a wide range of subjects. Many of the entries concern phonoplex and multiple telegraphy, Edison's search for a new force, and his attempts to convert heat directly into electricity. There is also material relating to electric lighting, electric railways, spectroscopy, hearing aids, cotton pickers, artificial silk, and numerous other items. One book contains notes about the layout of the grounds at the Fort Myers home.

The books appear on the microfilm in the following order:

1. N-86-03-18 (1886)
2. N-86-04-03.1 (1886)
3. N-86-04-03.2 (1886)
4. N-86-04-03.3 (1886)
5. N-86-04-05 (1886)
6. N-86-04-07 (1886)
7. N-86-08-17 (1886, 1887)

Fort Myers Notebook, N-86-03-18

This notebook covers the period March 1886. All of the entries are by Edison and by Mina Edison, whose name also appears as a witness. Most of the notes by Mina Edison deal with lamp experiments. A few concern an electric engine and a hearing aid. The notes and drawings by Edison pertain to magnetism, the search for a new form of energy he called XYZ, and the direct conversion of heat into electricity. Also included is material relating to lamp experiments, the phonoplex, a balloon telegraph, a process to turn natural gas into lampblack for ink, a cash carrier system, a spectroscope design, a storage battery, a hearing aid, and a cotton picker. The book contains 288 numbered pages.

Blank pages not filmed: 110-111, 256-275, 282, 285.

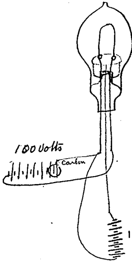
Missing page numbers: 283-284.

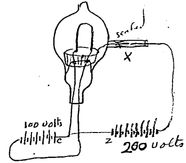
N-86-03-18

N-86-03-18

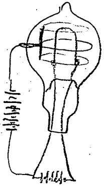
March 18 1886

TAE
Mina





X is 1st sealed vacuum obtained — then wire is shoved in X & 200 volt charge given it & while charging X is again sealed & wire drawn away leaving the platina cylinder inside of globe permanently charged 200 volts Contrary



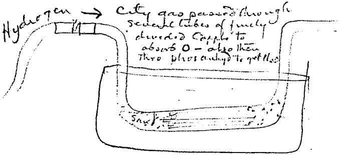
Run Curve on 6 of these

TAE
Mina

Carbonize in 4 days in reducing Solution.

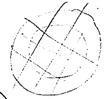
also water absorbing Solution.

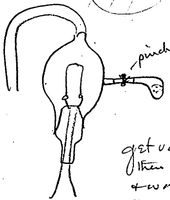
Linseed oil. also Linseed oil sulp Iron Proto Saturated Solution. Chloride Zinc - Protochloride Tin.



Slow Carbonization 3 days —

Mch 18 1886 TAE
Mica

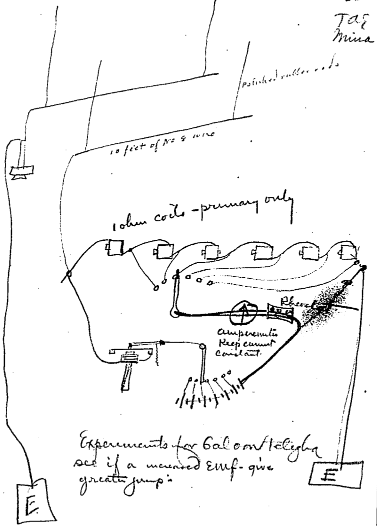




get vac fair - open pinch cock
then get another good vac
+ work Lamp then Let in
Osmic acid + bring Lamp up
high to deposit Osmium -

Mch 18 1886

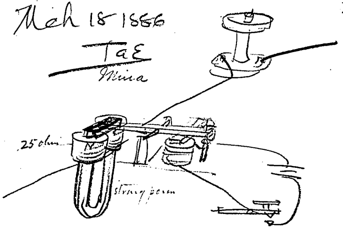
TAE
Mina



Experiments for Gal con't telegh
see if a increased EMF give
greater jumps

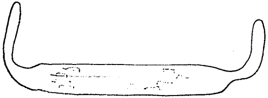
Mch 18 1886

TAE
Mina

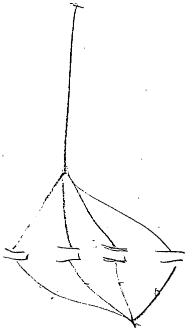


See if sudden pulling off armature gives good phonoplex Gumps —

Mch 18 1886
TAE
Mina

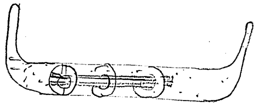


Carbonize 64 hours slow
in Linseed oil = photo salts
that are reducers in Linseed &
alone if can get heat also
Chloride Cal & Chl Zinc
glacial phos acid. in
sealed tubes to get
pressure —— also in
Parafine - Napthaline - & high
melting point Hydrocarbons



Mch 18 1886 ~~~

Mica

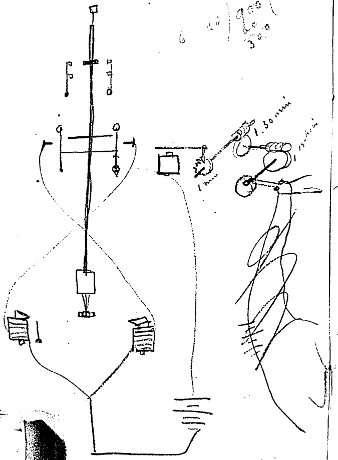


Sealed tube with glass or nickel washers - in center of which pass the filiments, to hold them in position - Then Carbonizes with tubes sealed and filled with powdered metallic lead - fusible metal - Zinc etc,

Mch 18 1886

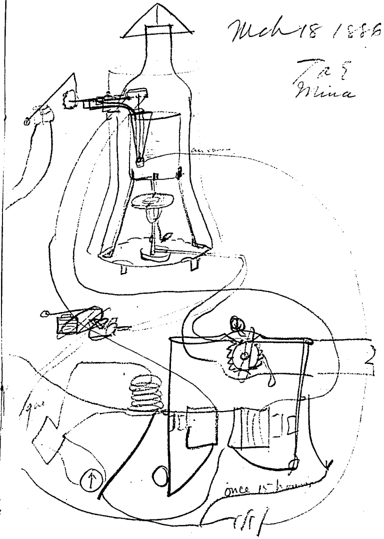
TAE
Mina

Process for burning natural gas into Telephone Lamp black + then to book ink — Experiment —



Mch 18 1886

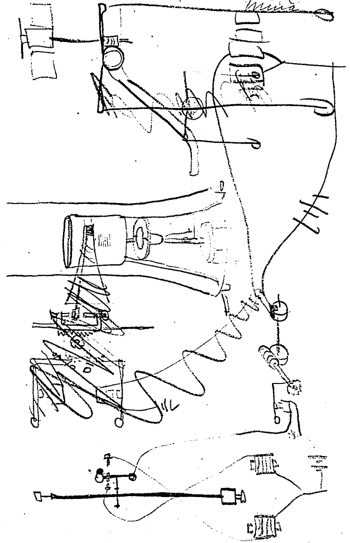
TAE
Mina



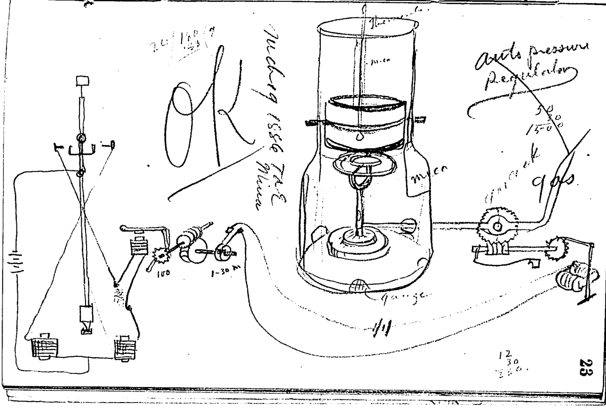
100 min. 1 Rev Min

Mch 18 1886

Tea 5
Mins

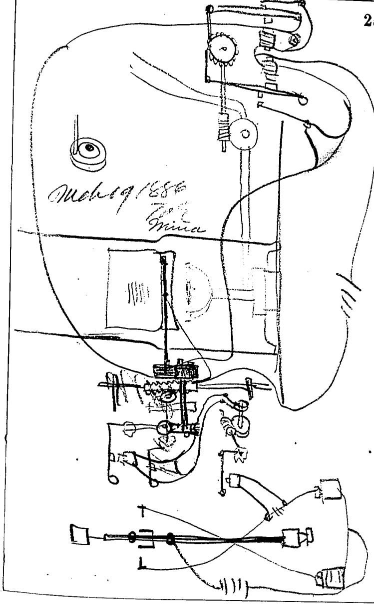


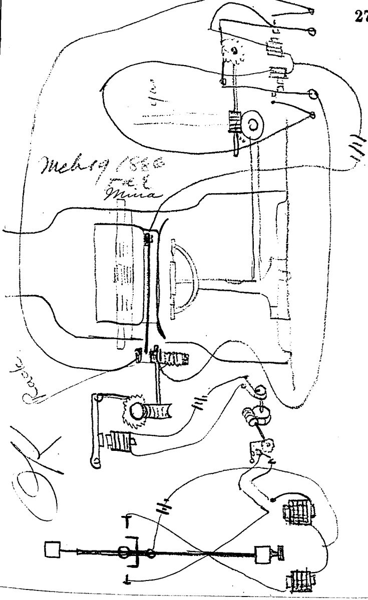
100 1 min - 30
60
60/1800 | 29
120
600



Mch 19 1886 TAE
Mina

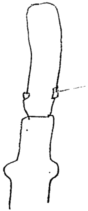
12
30
360


Mch 19 1886
Mina


Mch 19 1886
TAE
Mina

Mch 19 1886 TAE
Mina

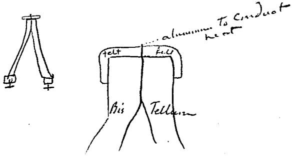
Experiment quantitatively & accurately on bringing up metals in Vacuo - Iron - Steel - brass - German Silver Nickel Tin Aluminium - Zinc - Lead - Magnesium - Cadmium, ~~Nick~~ Cobalt, Copper - Silver - gold - platinum - Read Res & amperes & volts from 100 to melting point & Curve it. Try these metals in Hydrocarbon Vapor to deposit & afterwards cut out.

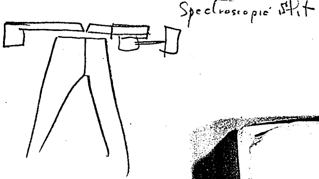


paint enamel over all the metal & part of widened Carbon & bake in sand up to hardening point as in pottery

March 20 1886 TAE
Mina

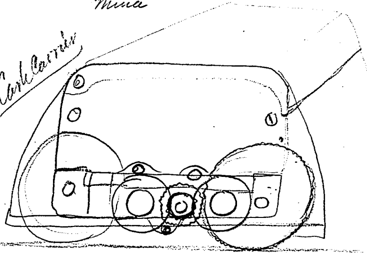
Thermo-sensitive - for measuring fine line ray as in Spectrum & still have advantage of best Couple.

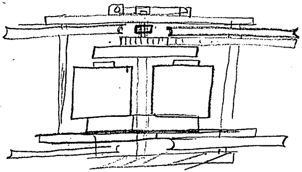




Mch 20 1886
TAE
Mina

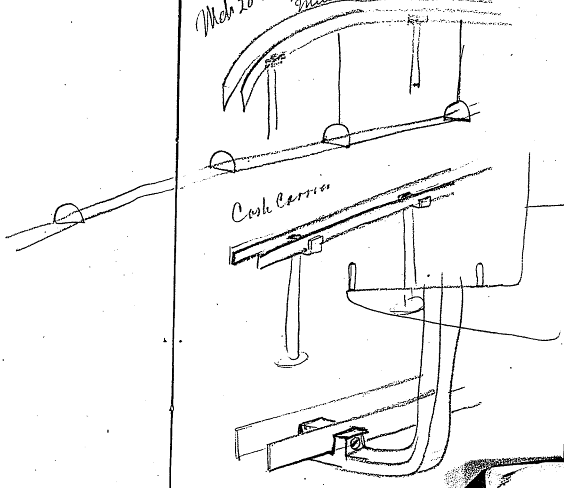
Cash Carrier





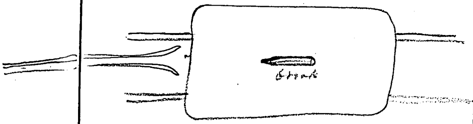
Mch 20 1886

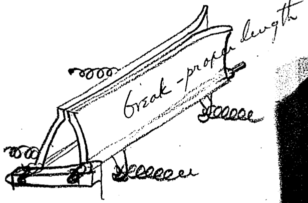
Tat
Mica

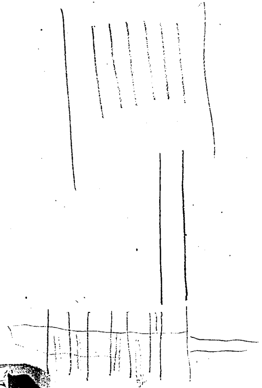


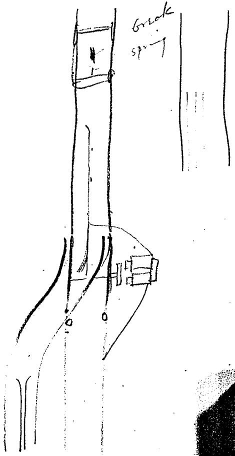
Mch 20 1886 Tak
Mina

Cash Carrier





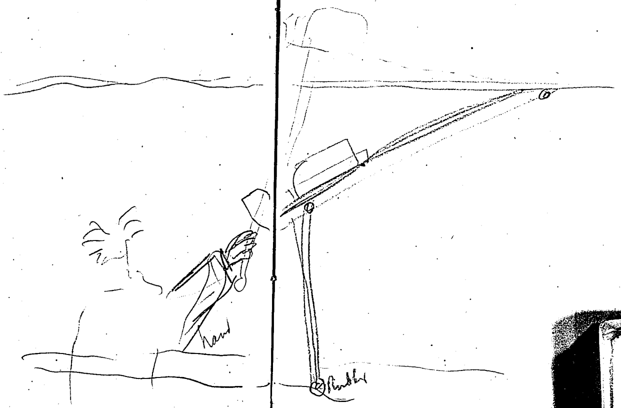



Break
spring

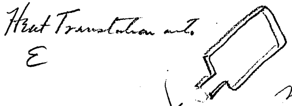
Mch 20 1886

TAE
Mina

Cash Carrier

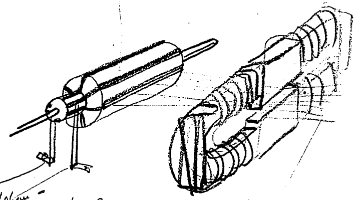


Heat Translation into E



Con of wood.

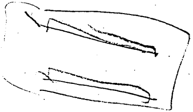
Mch 20
1886
TAE
Mina

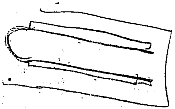


Telphone -
galvanometer Low Res
Emfgraph

Use bands of Copper Zinc
Lead Tin - Cadmium - Silver
nickel Iron - German Silver
Antimony - platina -
Carbon - Sulphides of
Lead - & other conducting
Sulphides phosphides
also tubes filled with. — over

Magnetically polzd
beam of Light or R
Heat.





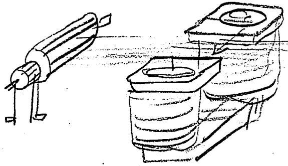
Heat Translation into E Continued from 43 —

Mch 26 1886 TAE Mina

Conducting Solutions, with non-polzbl Electrode.

also all above Expmts ~~try~~ for. XYZ —

Now magnetize the beam of light at right angles

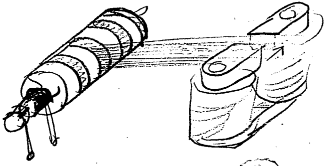


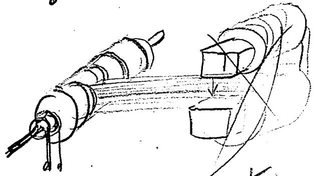
Try all the above

Now use polarized light — and magnetically Effect it straight + at right angles

Heat Trans Contd from 45

Mch 20 1886 TAE Mina

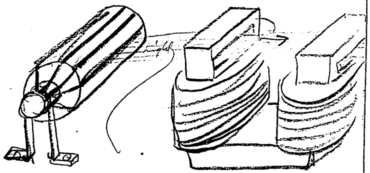




Same as tother

Heat Trans Continued from 47

Mch 20 1886 TAE
Mina



also—cylinder wound Spirally

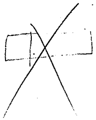
also used polarized Light—

If it gives reverse currents

Shield 1/2 of them

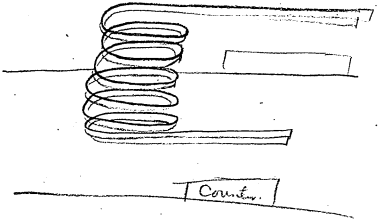
get Continuous ones
by filtering the beam through
Various substances.—

Electrify the beam -
by continuous ~~totoly~~ neutralizing
pass ~~it~~ beam through a filter containing
a conducting Solution with
electrodes arranged to send
powerful current through the
Solution - same direction +
at right angles - o



Mch 20 1886

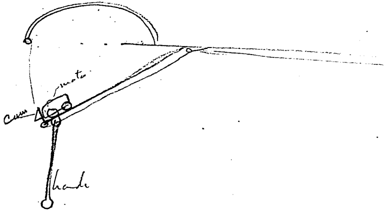
Cash Carrier - TAE
Mina



Method of getting on
Second floor with mater,
same as a Mountain Railroad
. Dum Poenfree

Mch 20 1886

TAE
Mina

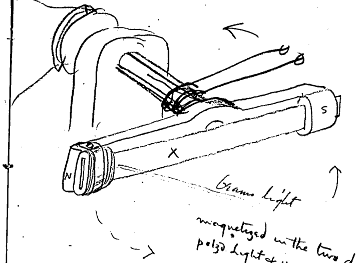


Cash carrier showing
Cam & lever, to give the motor
an initial start so armature
wont get stuck on Center

Mch 20 1886 TAE
Mina

Shock an oyster see if it
wont paralize his shell muscle
& make the shell fly open —

[illegible] TAE



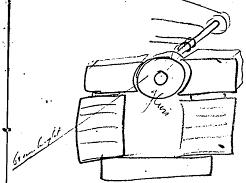
magnetized in the two direction
polzd. light & various changes

X is 5/1000 sheet steel magnetized N + S,
beam light strikes near end. whole rapidly
rotated use telephone, Mirror etc,
Theory is that ~~Heat~~ Heat will disturb the
magnetism + induce a Current

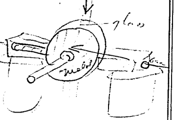
Translation Heat light into E or XYZ

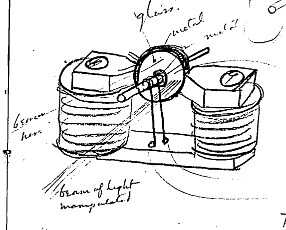
Mch 21 1886

TAE
Mina



(glass
manipulated)





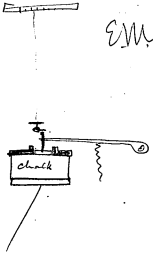
Various Solutions

Telephone & Mina
+XYZ -

EMG

Mch 21 1886

for
Mina



Theory - The water will raise the end of lever resting on chalk up & work mirror —
Try paper & other porous substances which swell by water.

How would it do to make Zinc amalgam - & then moued Zincs for batteries by Hydraulic press - always be amalgmated [illegible] Fuller's —

Mch 21 1886

TAE —
Mina

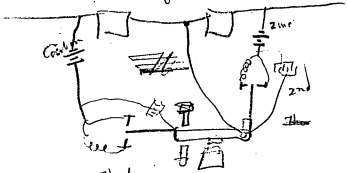
For Storage battery plates —
mixed powdered Lead & dry Salt
or other large crystal soluable
Salt - by hydraulic pressure
then dissolve out —

Make Collection of rare metals
large quantities,
Tellurium - Selenium - Vitrous & metallic, Cadmium -
Thalium - Bismuth antimony
Tin, arsenic, Molybdnum - Silicon
& others -

also Selenides phosphides, Tellurides
Sulphides, arsenides.

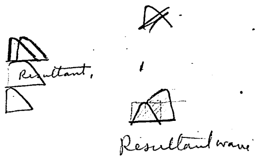
Mch 21 1886 TAE
Mina
Phonoplex

Prolongation of the wave — for long circuits.



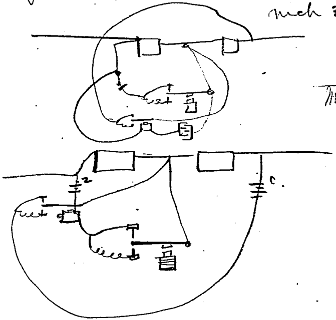
This leaves first & closes first.

Try

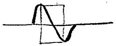


Phonoplex Reverse Circuits

March 21
1886
TAE
Mina



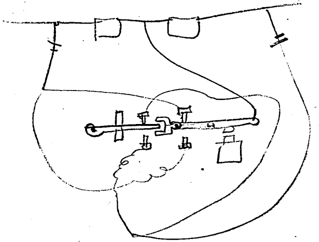
double strength



Mch 21 1886

TAE
Mina

Phonoplex



Swing-held by friction

Mch 21 1886 TAE
Mina

Phonoplex — If get cheap Condensers work phone thro a Condenser around magnet thus preventing change of adjustment by variation in strength line Current —

March 21 1886 TAE Mina

XYZ Experiments Electrodes to be immersed & weighed in various solutions —

100 Zinc
" Copper
Lead
Iron
Carbon
Antimony
Tin
Cadmium
Molybdnm
Nickel
Thallium
Silver
Bismuth
X
X
X
X
X

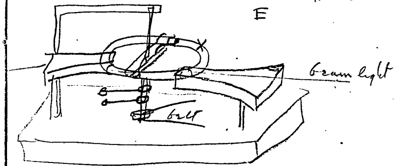
100 Hard Rubber
Sulphur
phosphorus
Amorp phos
Paraffine
asphalt
Sulphide Iron
" Lead
Tin
Zinc
Copper
antimy
arsenic
X
X
X
X
X

Phosphide Iron
Lead
Tin
Zinc
Copper
antimy
arsenic
X
X
X
X
X

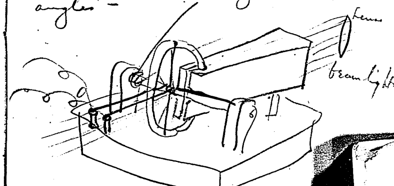
Mch 21 1886 TAE
Mina

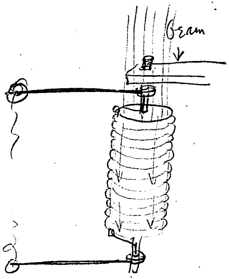
all the Borides - peroxides - Iodides
fluorides, Selenides, Tellurides -

Translation Radiant H & Light into E

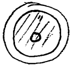


X circle of glass tubing 3/4 @ 1 inch dia - filled various conducting fluids. rotated to Cut beam light various angles -





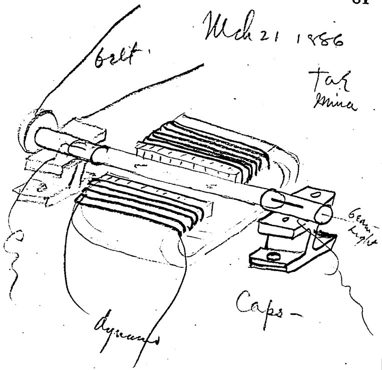
Mch 21 1886
TAE
Mina



Beam Light
Circular passes through Tubes

Coil Tubes filled various Solutions

Mch 21 1886

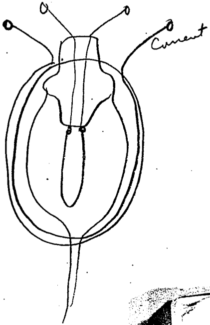


XYZ - use Iodide K Sensitive + accumulator -

Try some expmts with vibrator primary Coil one ohm to 7 powerful battery plates of various metals in liquids insulators immersed like meter plate

Mch 21 1886 TAE
Mica

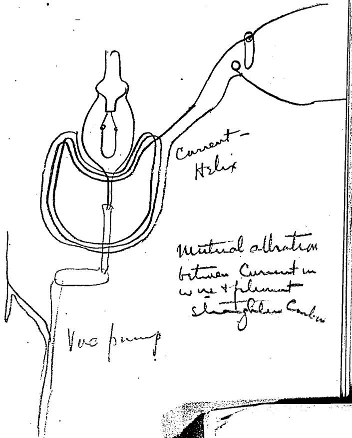
Straightening filaments
in Lamps



Mch 21 1886

~~Straightening filiments~~

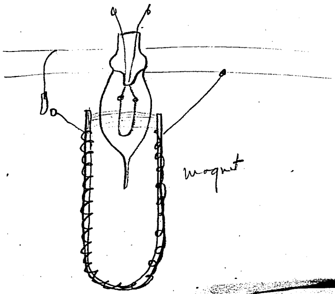
in Vacuo —

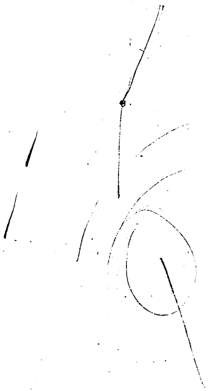


Mutual attraction between Current in wire & filiment ~~straighten Carbon~~

Mch 21 1886

Straightening filaments in lamps—





March 21 1886 TAE —
Mina

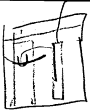
Use Tellurium Electrodes as dehydrogenizer - saving powdered Tellurium —

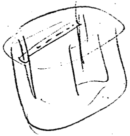
Try Carbonize thin Celluloid in Linseed oil hot —

See if Licorice can be bleached if there are more than one substance that can be seperated by solvents or precipitated

---

Licorice as clamps to Enlarge pasted on filaments before Carbonization

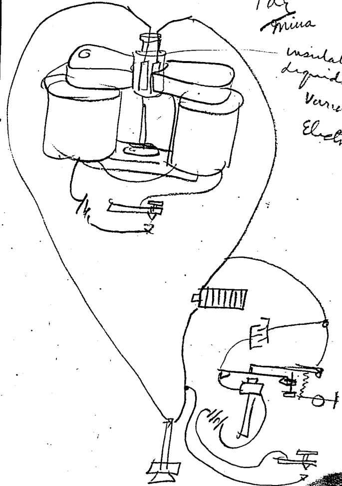




Mch 21 1886

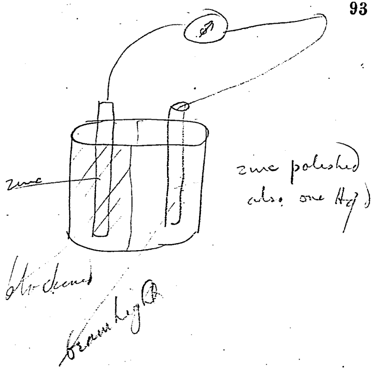
TAE

Mina



insulating liquids

Various Metal Electrodes



Sol Sal Zinc

Mch 21 1886 —

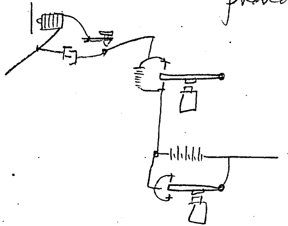
TAE
mine

Pass beam of light for spectroscope between poles powerful Electro magnet notice any displacement lines with big spectroscope also magnetize glass prism — also the Bisulphide Prism also a glass cell prism use various liquids —

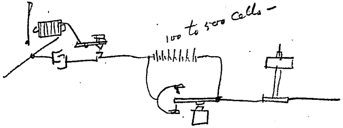
Mch 21 1886

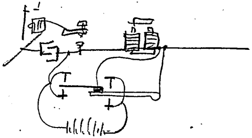
TAE
Mina

Phonoplex

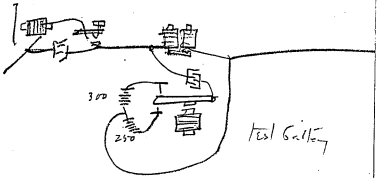


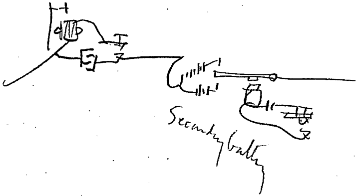
Mch 21 1886 Tel
Mina
Phonoplex



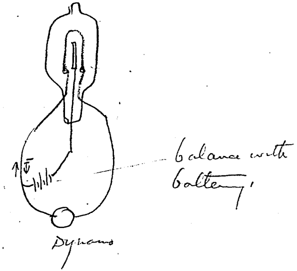


Mch 21 1886 TAE Mina
Phonoplex

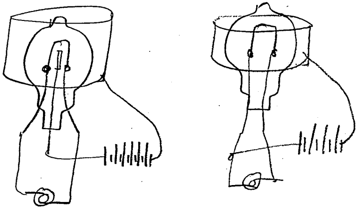


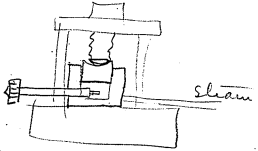


Mch 21 1886 TAE — Mina



Mch 21 1886 TAE
Mina





squeezing out licorice
filaments with broadened Ends

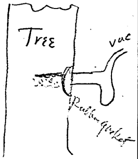
Mch 21 1886

XYZ Solutions for immersing the Tae Mica
various substances

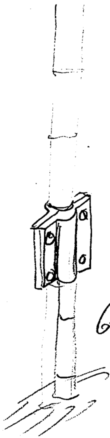
Cyanide K	Phos c Anhydride.
Ammonia Conc	Sulphide K
Bisulphide Carbon	Nitric acid
Benzol	SO_4 — 3 proportions
Benzine	HCl—strong
Nitro Benzol	Chloride Zinc
Aniline Oil	acid Pot Sulphate
Bromine	Caustic Soda Potash
Chloral Hydrate	Lime —
Absolute Alcohol.	Sulphate Iron
Turpentine	Ferri—+Ferro Cy Iron
Oil Cassia	Nitroprusside Sodium
Linseed oil	Sulpho Cy-K
Pure Sulphuric acid	Chl ammonium
Fuming "	Nitrite Soda
Iodoform	acetic acid glac
Phenylamine	acetate Lead
Ether	Chl Calcium
Chloroform	Borax
Tar—wood	Sulphate Manganese
" Coal	Molybdic acid
Carbozotic acid	

Water glass
Hydrocyanic acid
Butter Antimony
Bichromate K
Iodide Methyl
" Potassium
Iodine H_2O
" in Bisulphide Carbon
Chloride Carbon
Napthaline
Ammonia Citrate Fe
Chlorine Water
Peroxide Hydrogen
Permanganic acid
Permanganate K
Fluoride Ammonia

Mch 21 1886 TAE
Mina



getting Turpentine by
Vacuum



Bamboo

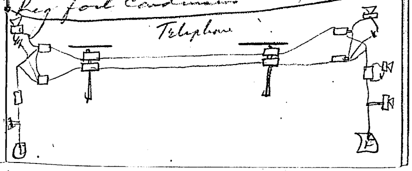
Clamp to Compress fibre

Mch 21 1886 TAE
Menlo

Spin out Balata for silk — also
balata combining resin for ditto

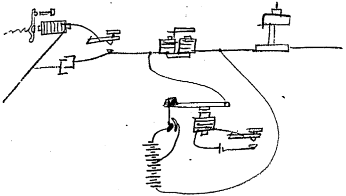
Make 20 1/2 mfarad Condensers of Copper +
iron — with parafine paper — then make
artificial zinc Sulphate Line — + make
this Equivalent to Atlantic Cable
Then with a small Emf from a
section of a resistance.
+ sensitive Mologroph vibrate
try rapidity transmission +
Correct same by substituting
Reg foil Condensers

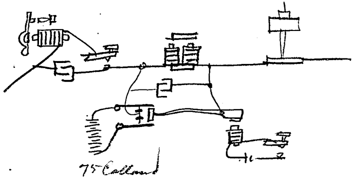
Telephone



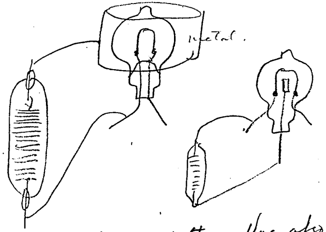
March 21 1886 TAE
Mina

Phonoplex

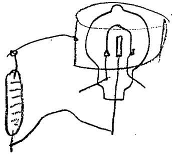




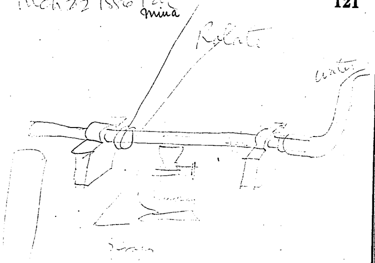
March 21 1886 TAE —
Mica



DuLuc Drypile. 1000 Volts. in Vac also
not in Vacuum —



Mch 22 1886 TAE
Mina

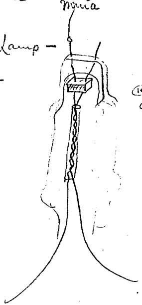


Lamp [illegible]

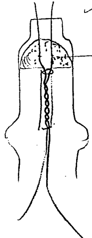
March 22 1886 TAE

Municipal Lamp –

Exp – Sugstn –



ordinary non-conducty
(10) only partially "
charcoal which
Conducts with the
500 volts
practically none at
55



1 powder of non-conducty lampblack
with or without a non conducty oxide

2 Conducting lampblack with various
portion of non-conducting Oxide. so great
an amount of Oxide could used to make
it an insulator yet the 500 volts
will jump from particle to
particle

OVER

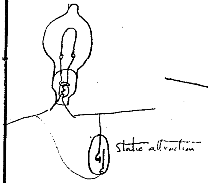
Mch 22 1886 TAE
Mina

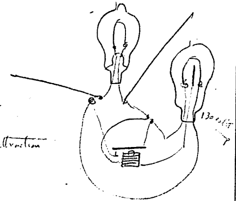
Continued from 123

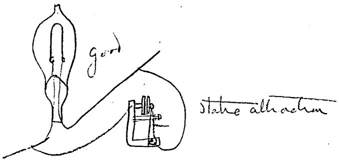
3 Dry amorphous phosphorus
4 Sulphide Molybdenum -
5 Sulphide Lead -
6 Powdered Calcopyrites
7 ordinary pyrites
8 Powdered arsenic
9 " Rutile
10 Peroxide Lead & also Perox Manganese mixed with non-cond'g oxide —
11 Iodide Copper mixed with non-cond'g Oxide

March 22 TAE
Mina

Municipal Lamp Cut outs

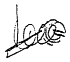


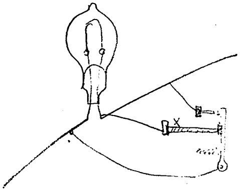




March 22 1886 TAE

Municipal Lamp —





ok

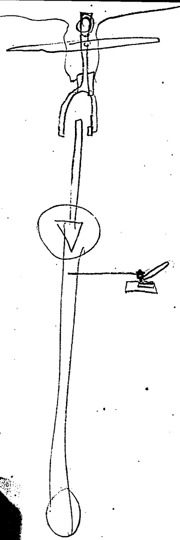
X is a stif stick of wax or other Substance mixed with a Conductor so that 55 volts dont heat it enough to soften but when 500 Volts comes the heat softens rod & lever touches point & cuts out Lamp —

March 23 1886 TAE —
Mina

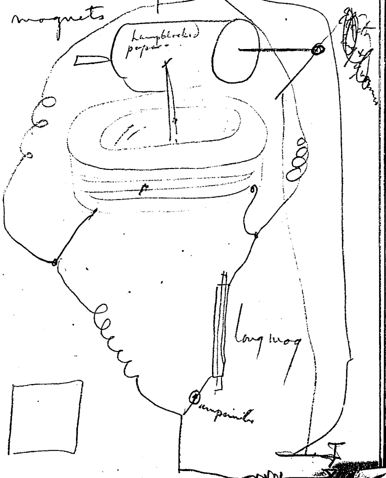
Make a set of long magnets of ½ inch norway iron of following lengths. 1, 2, 3, 4, 5 6 8 12 20 40 feet in length wind evenly after covering with paper No 20 well insulated wire from end to end

Then magnetize with same amperes in each experiment

and move an astatic needle (or bifilar) with a weltered director magnet at different distances & make curves, opening & closing the long mag ckt — I want to get the propagating power for the lines of force of very long magnets — EMF of magnetism analogous to Electricity



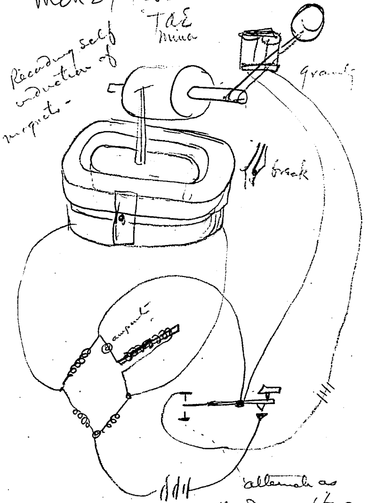
at same time get the charging + discharging times of these magnets



Mch 24 1886

TAE

Recording self induction of magnets -



alternate as Readings is ~~after~~ open or closing

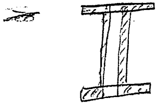
Mch 23 1886 TAE

instead of allowing the cylinder
mina
to ~~Rotate~~ by dropping of a lever
by gravity Have the cylinder
Connected by friction to a
Constantly rotated Elec Engine
with governor - release by
~~Clock~~ magnet = this will
give true curve on blackened
paper - perhaps only a
Torsion wire galvanometer a la
W.U. Phelps - style = bristle to
mark -

~~If the~~ If the Hangmagnet
Expmts show any abnormal
results. Make following

Mch 23 1886 TAE
Mina

500 feet smooth soft NO 4 iron wire - cover carefully with paper spirally - wind its whole length with single layer NO 22 wire Then wind this on wooden Helix like magnet,



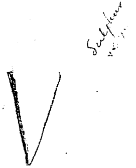
also make one of lead zinc Tin. & also Copper same length instead of NO 4 iron

Mch 23 1886 TAE
Mina

Get some sheet Tin + have Taylor the foundryman cast some thin iron on them for success full get some fancy stamped tin ware + cast thin plates if good have some fine samples made + arrange with Troy Stove men.

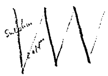
also Try brass work Tinned + brass Cast on it at Bergmanns

Try that Condenser over made with sheets of oxidized linen oil. see if it will make as Strong as 6 or Flemmy



Make XYZ Thermo piles of following

10 pair series –



using Radiant heat Light, Electricity magnetism one end Cold on another

also, Radiant heat one end Light falling on other end

also Rheat + Electricity Op Ends – also Rheat + magnetism

also mag + E

also Light + E

Light + mag.

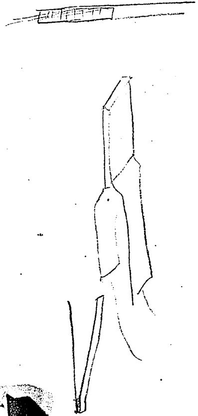
Sulphur – Copper
Sulphur glass
Sulphur Hardrubber
Sulphur Arsenic
Sulphur Paraffine
" asphalt

Sulphur Sulphide Iron
Sulphur Melted Chlorides + other Salts.
" Tin Zinc Iron Lead, Carbon

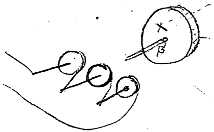
Paraffine. ~~Arsen~~ + the above

Arsenic + the above

Hard Rub + the above Melted Salts + the above + one with the others

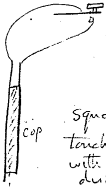


March 23 1886 TAE
Mina



Copper ring
X moulded
substance
β the Copper wire

Thermo disc -

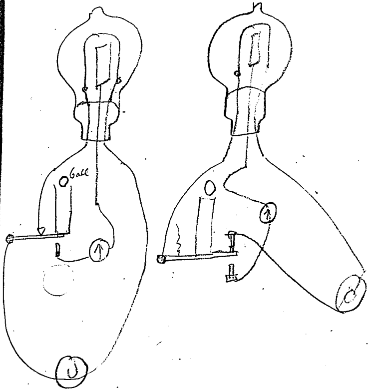


The EMF bet Cop & an insulator as a Cop Thermo must be great, try lime - Water etc ~~sides~~ Cell being of Copper -

Square foot surface - touch one side quickly with flame - then discharge thro sen gal

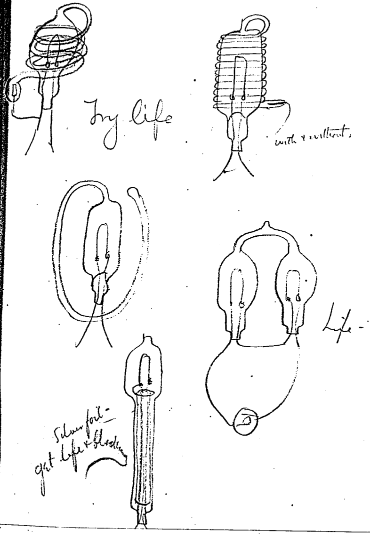
Various Insulators.
Hard Rub - Sulphur
gutta, etc

Mch 23 1886 TAE
Mina

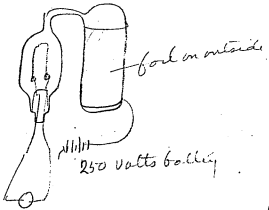


See if there is a Current
after the Current is discontinued
but there is still a brilliant.
Incandesce use 100 cp Lamp

March 23 1886 TAE
Mina



March 23 1886 TAE
Mina



Try battery to both poles - also Holzmoe - also reverse battery also 1000 cell ~~test~~ battery,

Maybe vapor Hg plays important ~~part~~ part. Try jump spark for couple hours after Lamp finished before getting life (to make ozone

March 23 1886 TAE —

Mica

make 10 Lamps for Life with dry phosphorus in —
also Sulphur — also Zinc —
Tin, Lead, Bismuth, Iron —
Antimony — Arsenic — Iodine,

Carbonize some filaments with long Cotton fibre on them + put in Lamps so filaments hang down + show static attraction.

March 23 1886 —

XYZ

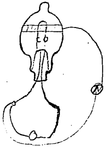
Make self Vibrator but with points that can be made to change the Ends of Zinc Tin etc wire so whole ckt will be of proper material to Conduct XYZ

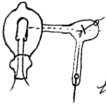
also a Telephone where every Kind of change of material can be made — perhaps 40 or 50 Cheap telephones Every one an anomaly of XYZ devices would be better & run the scale on everything with in all XYZ Experiments

TAE

March 23, 1886 Mnia

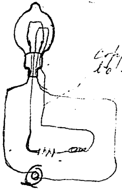
Make Lamps of all kinds of glass and test conductivity.





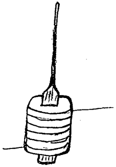
polished silver

Also one of polished hard rubber.



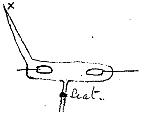
copper filament to take 0 out

Curve 10-



Try various liquid with capilliary index see if Magnesia or E contracts or expands.

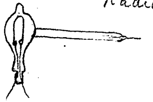
Same -

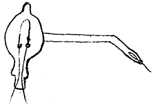


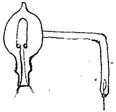
Put under water & break capilliary x off, let the $H_2O + SO_4$ remain in. Take out and melt x solid then decompose & burst it.

March 23-1886. Mina

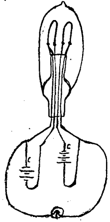
Radiant matter in vacuum.

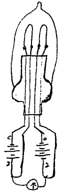




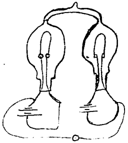


March 23-1886 - Mincy

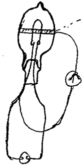




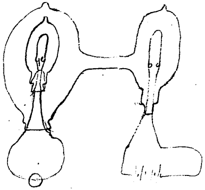
Vary incandescence of one, other constant



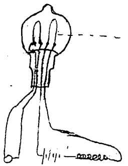
Ma[illegible] 23-1886- mica



Make measurements.



March 23 - 1886. Nima
10 Lamps each

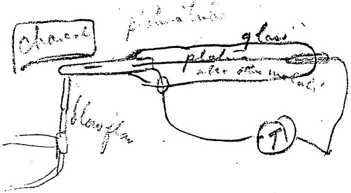


Zinc
Copper
Tin
Aluminum
Magnesian
Iron
German silver
Lead.

Work these slowly after Reg Lamp, finished & good vacuum - Afterwards work them gradually up, slowly keeping vacuum running until busted -
Run Life Curve -

March 23 1886 TAE

If high incandescence of Carbon filament causes electrification + conduction in vacuo then perhaps platina heated by flame (blowpipe) to high incandescence will give current to Central Electrode



March 24 1886 TAE

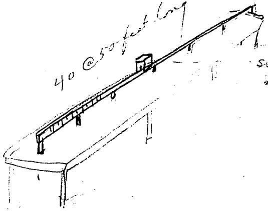
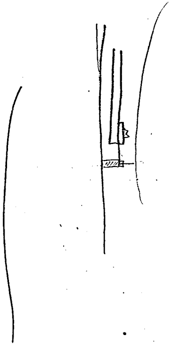
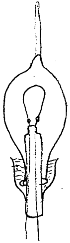
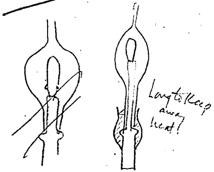


Table scale & slide
with music box
to test deaf
apparatus



March 24 1886 TAE

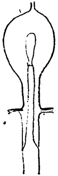




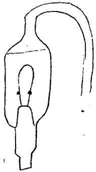
Try following sealing Compounds

Sealing wax
paraffine
Paraffine + Asphalt,
plaster paris set, then heated + plunged into paraffine —
Zinc white asphalt + gutta percha —
Dammar softened by Hot Linseed —
+ others

Mch 24 1886
TAE



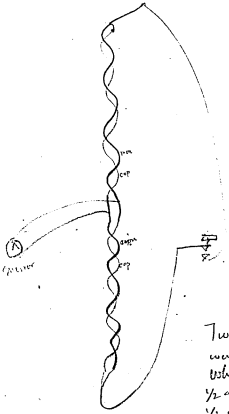
ground disc polished
linseed oil oxidized too
thinly on one surface
also — Balata, Rubber —
gutta — gum —
Vacuum Kemp process



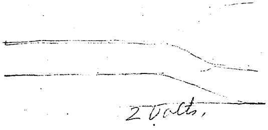
good

Regular filament
worked then painted
with licorice mixed
with oxide magnesia as
much as it would stand
then recarbonized by
Current very slowly :
in atmosphere Hydrogen
or other inert —
Idea to get coating
nearly non-conducti.

Mch 24 1886 TAE



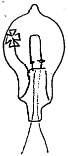
Twisted Iron & Copper
wire bare & touching
whole length but
1/2 of iron connected to
1/2 of Cop & mirror g
put across bridge to
see if Copper conducts
faster than iron



10

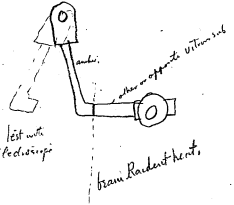
March 25 1886 TAE

Hang ten lamps up by small wires from Center of Ceiling of a room or rooms get life also 10 lamps surrounded within several inches with metal grounded, get Curve of life — Think the former will show very much better —



screen of mica geneva cross see if matter purely radiant

Mch 25 1886 -



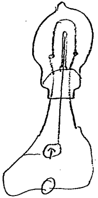
Theory is that the two vitreous substances rubbed together are positively & negatively electrified by the heat acting on surfaces as Thermo pile. They are thermo piles of very high EMF same as Bismuth nickel or antimony are charged very low EMF—!

Oct 1 1887 TAE.

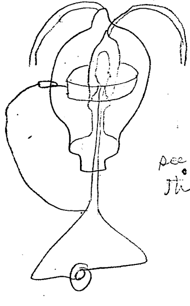
Rotate collectors to take off E use fine wire primary + Coarse secondary to reduce Tension

Mch 25 1886

TAE



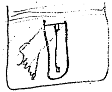
The Centre wire guarded with thin glass. ^no^ sec of conduction,



sec of conduction through glass

Mch 25 1886 —

The oxidation on surface of a filament by hot sulphuric acid throws it into all kinds of contortions by relieving the strain of the surface, in Experiments on slow carbonization suspend in sand bath in tube single filament, + let it contort as it will, then try one with quick carbonization

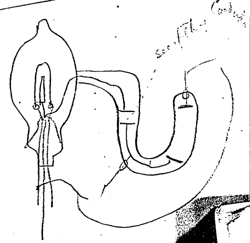


March 25 1886 —

Put several of the finest fibres together with ~~L~~ Licorice with broken end of Licorice - Sandwich auto regulated preliminary -

See if Licorice dissolves in any of the Hydrocarbons etc.

Roll out Licorice hot - also using oil -



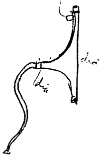
March 25 1886 TAE

In the auto prelim sand battery put several sets of Carbons taking each set out at different weight ~~of~~ degrees, Carbonize fully & Run curves on finished lamps

perhaps paper soaked in Licorice calendered Hot stamped filaments can be carbzd by auto Prelim so perfect as to beat bamboo, then a million c'ld be carbzd at once —
use uncallendered paper so Licorice fill up space
perhaps 25/1000 uncallendered can be cut with revolving knifes so there is no cavities & perfectly even quality obtained. if impossible do this naturalstate it could be soaked glue - Rosin etc making it hard & thus cut down to size

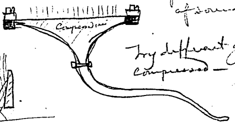
March 25 1886 TAE

Compressed air

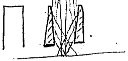


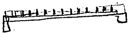
if vacuum doesnt conduct sound then diaphragm & compressed air ought to be the thing

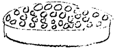
full of hairs to prevent rebound of sound



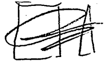
Try different gases compressed —

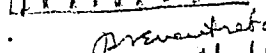




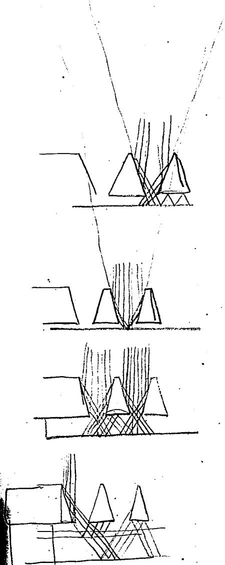


Holes inch deep





prevent rebound of sound Slightly beveled or Cone shaped holes

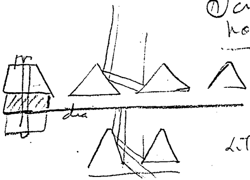


March 25 1888 TAE

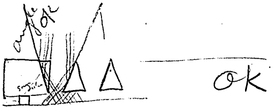
Deaf apparatus

(1) crease of cone
hole so over two
dia

no good

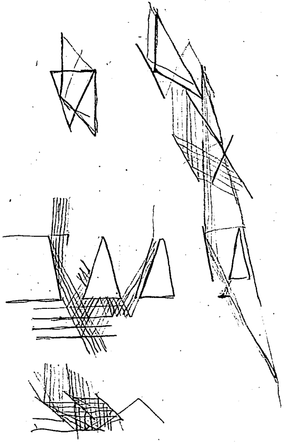


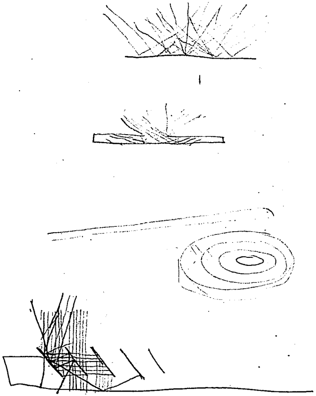
Little Better



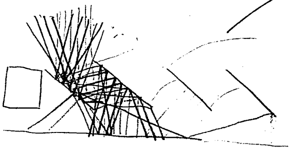
OK

distance of dia from underside
distance of bevel from straight line
but try all distances





March 25 1886
TAE

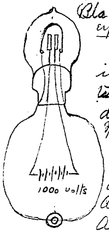


Coned rings
seem to fulfill
Every Condition
for generating magnet
a dead beat generator without
[illegible] of the air
[illegible]
wave

March 25 1886
TAE

1/2 section
Coned rings —
Mag coned partitions
think I have something
like this in Laboratory

Mar. 26, 1886, Mina.



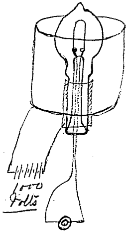
Blackening experiment of

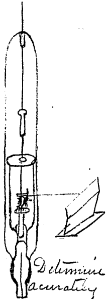
Condensers

Try condenser paper dipped in Rosin disolved in turpentine. Rosin parafine disolved in turpentine. Rosin Turpentine, Linseed oil, Napthaline Parafine in Benzine.
Asphaltum in Turpentine
Asphaltum Parafine in " "
Asphaltum Parafine in Benzine
Asphaltum Linseed oil. Turpentine
Asphaltum Linseed oil Parafine Turpentine
Gutta Percha in chloroforme.
Gutta Percha Rosin in Alcohol & Chloroforme
Quick drying Japan -
Shellac Alcohol chloroforme Gutta Percha.
Bisulphide Carbon - Rubber
Bisulphide Carbon Saturated with Sulphur, also Parafine -
Coach body varnish
Furniture "
Collodion Saturated with Rosin
" " camphor
Alcohol Rosin + Camphor.
Rosin Camphor parafine Turpentine
Alcohol Rosin (Saturated) dip paper & while still sticky, after drying, sift-

from 100 mesh sieve powdered chalk until it is wholly covered. both sides build condenser from this.

Mar. 26, 1886, Mina

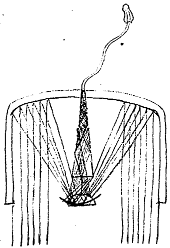


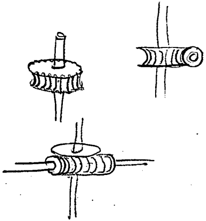


Determine accurately
Expansion Carbon + Candle power.

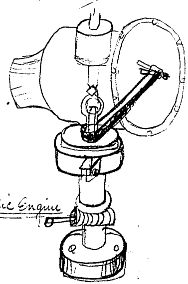
Determine if the volts or amperes from Centre pole lamp and candle power Have a definite relation with life of lamp.

Mar. 26, 1886. Iunia.





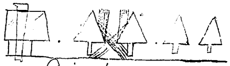
Mar. 26, 1886. [illegible]



Electric Engine

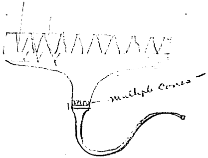
Apparatus Electromotograph with circular discs of insolating material such as glass with four inches of area, flat disc of platinum with 4 inches area; thin glass - also mica, Rubber, porcelain, etc, as thin as possible. Use vibrator, Induction primary and also secondary and ascertain if with increased area the Eng action is not a condenser action.

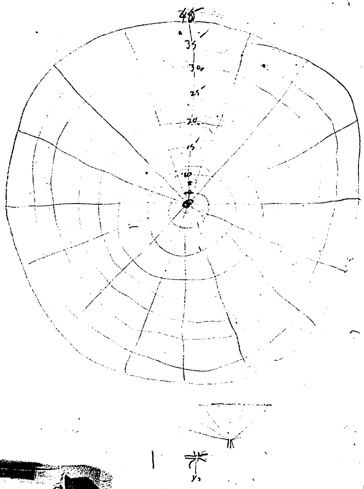
Mar. 26, 1886, Mina.



Diaphram

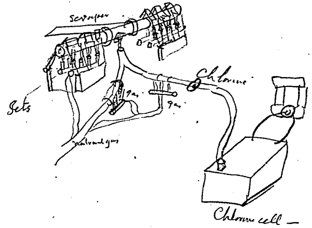
circular to act a chambers.





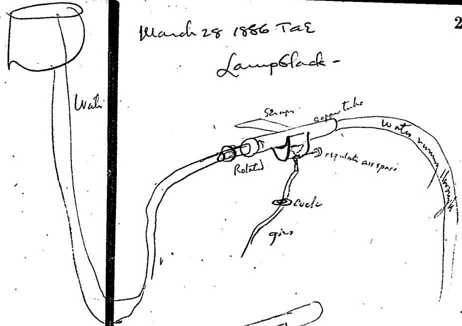
March 28 1886 TAE

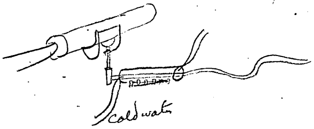
Lampblack -



March 28 1886 TAE

Lampblack -

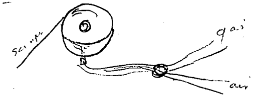




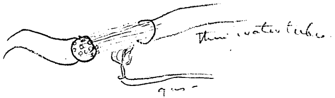
March 28 1886 TAE

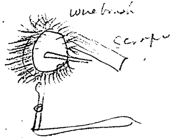
Lampblack

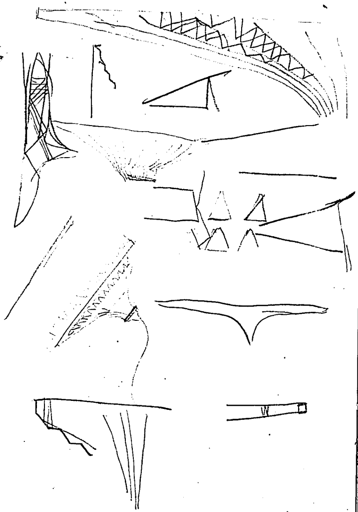
Mix water with Kerosene -



mix in proportions to just burn in enclosed Chamber -

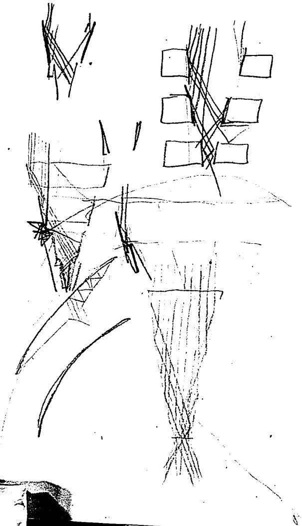




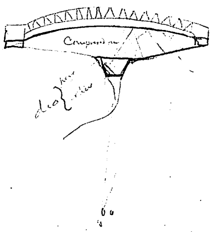


March 28 1886 TAE

Lampblack –



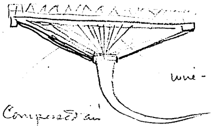
March 28 1856



Try Ruffs
wet parchment
[illegible]
spun [illegible]!
oiled silk or
Cloth,

[illegible]
oiled cloth,
[illegible] paper [illegible])
[illegible]

Mch 28 1886
TAE

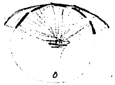


Compressed air

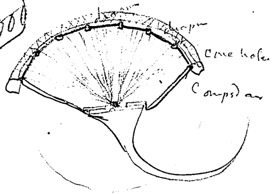
Try Ether, & other very light
Spec gravity liquid.
also try heavier [illegible]
under pressure.

Mch 28 1886

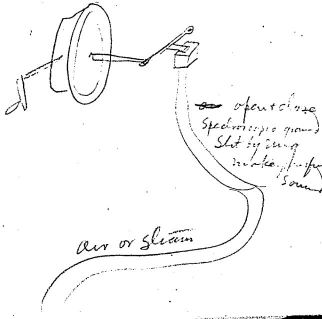
TAE

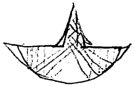


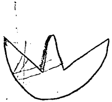
Good

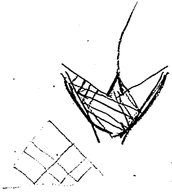


Mch 28 1886 TAE





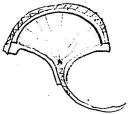




Mch 28 1886 TAE

Cone hole

B

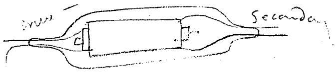


Sponged and rubber
10 inch diaphm
No compression
Was with Compression

in

March 28 1886 TAE

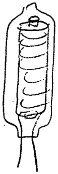
It may be that radiant heat could be magnetized in a certain way before striking the thermo pile & the heat in this form would nearly all be turned into E.



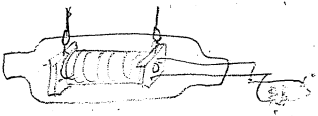
Try Regular Edison [illegible] C w Vacuum — heat tube well — see if sharper

~~TAE~~

March 28 . 1886 TAE



Try Reg 7 ohm
Coil in Vacuum
against one in
air on phonoplex',

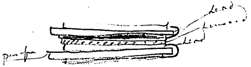


Try $\frac{1}{4}$ or $\frac{1}{8}$ inch spark coil
in High Vacuum - with
Vibrator outside

March 28 1886 —

Try in our small Condenser Box

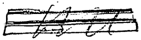
Lead — Linseed paper dried so still little sticky — Lead — Then parafine paper then Lead Linseed paper Lead — Connected in series.



Charge & see if constant

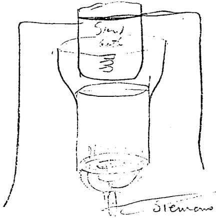
Volts like Steel battery —

Remember that Condenser that ~~[illegible]~~ acted as storage.



Mch 28 1886 TAE

Auto preliminary
Carbz Em



Siemens Regenerative Lamp for Heating using Bunsen flame or Even a row of Bunsen burners with glass Chimney using heated air instead of direct flame on Sand bath

Note = How would Copper 15 @ 20 mesh do instead sand - Conduct heat well -

March 28 1886 TAE

Lamp

Important = I think there is no doubt that if a coating of infusible Oxide can be put on the Carbon filament, that the Oxide will be carried by the static charge and not the Carbon = The attempts that have not been successful have been with the uncoated filament, The filament should be 3/4 Carbonized at least if not fully Carbonized and then coated and the Coating go through the preliminary stage the same as if it was a filament,

Coat Carbonized filaments with syrupy - Acetate, Chloride &c of Aluminum - Magnesium, Calcium, also Gelatinous Silica Boracic acid - If single coating not enough recoat after Each

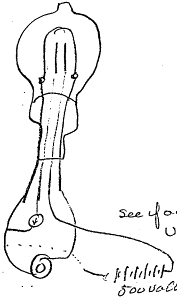
March 28 1886 TAE

preliminary say (500 deg) until proper thickness secured -

Perhaps If the filament fully Carbonized and suspended in a bath of chloride or acetate of magnesium - aluminum. Chloride Calcium Etc. and connected with the Current and the temperature of the evaluation kept high that the Oxide if Current is weak will be deposited in Coherent state on the filament =

~~Note~~ - get ~~the~~ Enamels ~~that~~ used on pottery - & mix infusible oxides with them - -

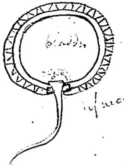
March 28 1886 TAE



See if addition of the 500 volts makes any change in the current going to the central wire —

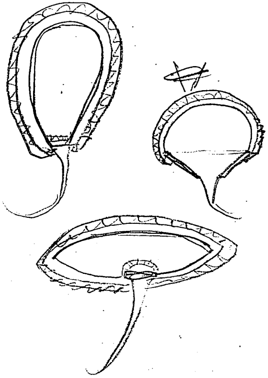
March 28 1880 TAE

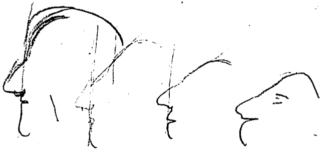
good !

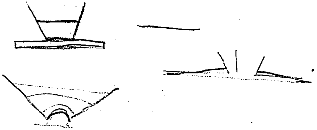


bladder or
metal, Rubber
etc Compound
are also not
thin dia membrane,
to ear tube
Completely Enveloped
with Coned circle -

March 29 1886 TAE

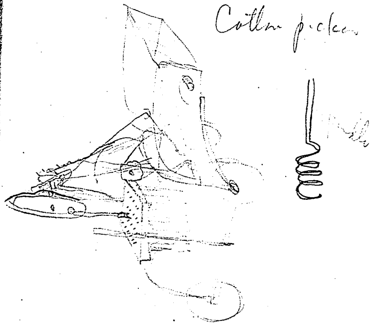


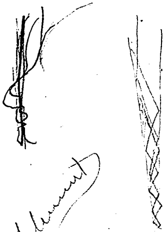




March 30 1886 9 AM

Cotton picker





Compound filament

Magnesia filament

Duplex filament

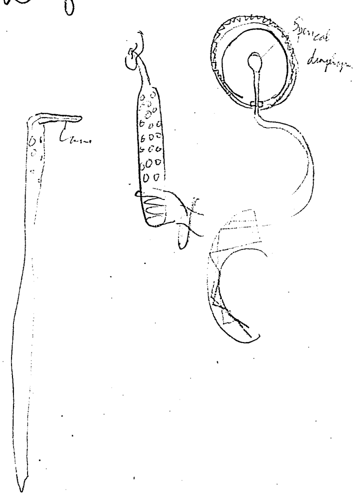
Insulated filament

Enamelled filament

Magnesia filament

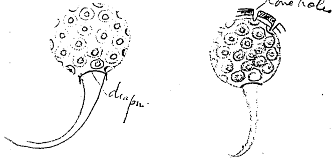
March 30 1880 TAE

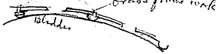
Draf -

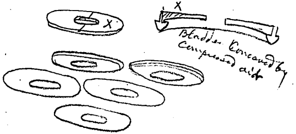


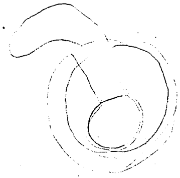
March 30 1886

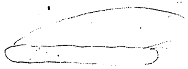
TAE

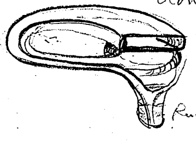






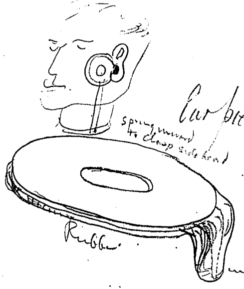




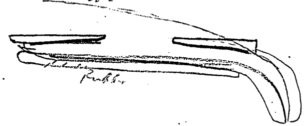


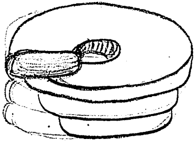
March 30 1886 TAE

Deaf-

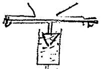


also-





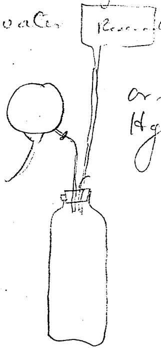
March 30 1886 TAE
Deaf

get Edison Telephone — also
gilliland Telephone also
The  and

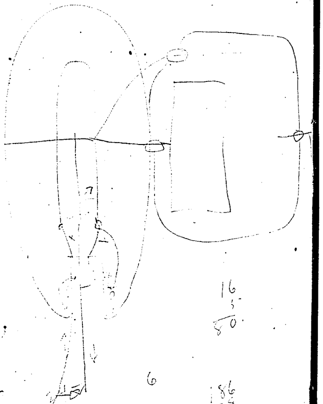
Test thoroughly the Effect of
Mouthpiece & Efficacy
of the chambers of all
sizes & shapes also if
chamber must be tight at
Edges — use a pipe
~~to sound also the voice~~

March 30 – 1886 TAE
Dref –

for Compressing the air
use water



or lift like
Hg in Geisler



16
5
80

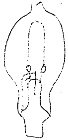
179
24
716
358
4296

42960

6

12
16
28

28 | 50 | 179
186
24
488
372
5208



40

60
40
2210

7

21
7)490
7

38

38 — Con... Surface
21
108 ... surface
43 surface

64- 44- 1350
8
10,800

38)108

6

44-

1350
2
2700
1600
4300

1350
2
2700
1600
4300

43)80 | 1.86
43
370
344
260
258

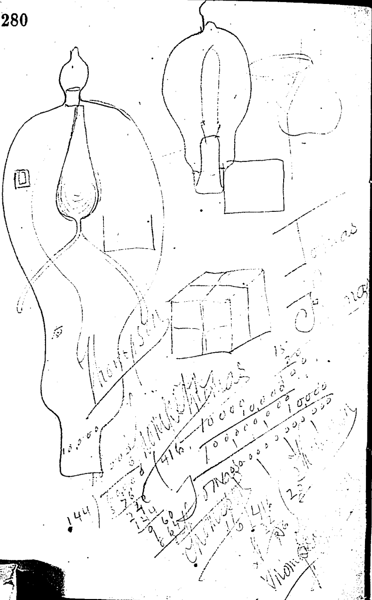
21

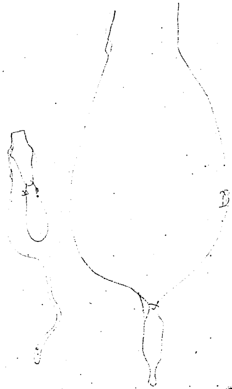
186
2
372
3.72

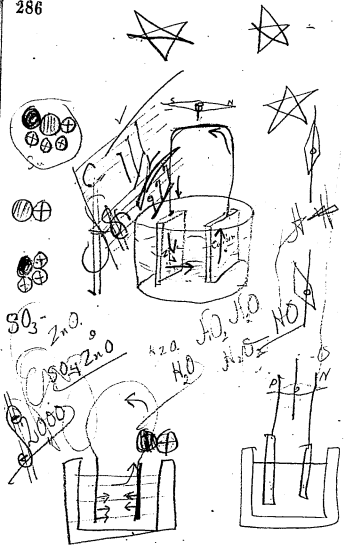
39 cp

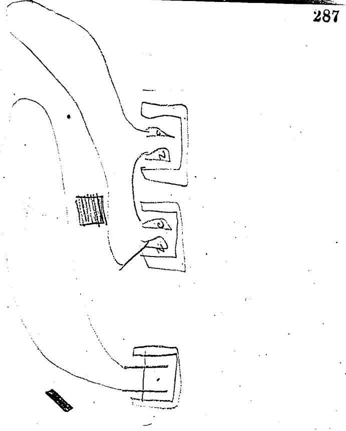
24

186
24
744
372
6)4464






S
N
SO_3
ZnO
SO_4ZnO
H_2O
NO
P
N



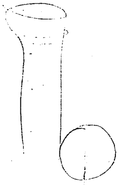
N-86-03-18

Fort Myers Notebook, N-86-04-03.1

This notebook covers the period April 1886. All of the entries are by Edison. Many of them concern the direct conversion of heat into electricity, magentic fields, and lines of force of the sun, earth, and other planets in the solar system. Other notes and drawings deal with the coating of carbon filaments, armature design, carbons for arc lights, multiplex and phonoplex telegraphs, a battery for the grasshopper telegraph, telephones, a cotton picker, a larynxial piano, and a hearing aid. Many of these entries are duplicated in Fort Myers Notebook N-86-04-03.3. The spine is labeled "27." The book contains 284 numbered pages.

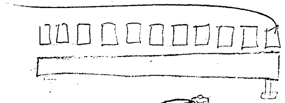
Blank pages not filmed: 226-255, 264-267, 274-275.

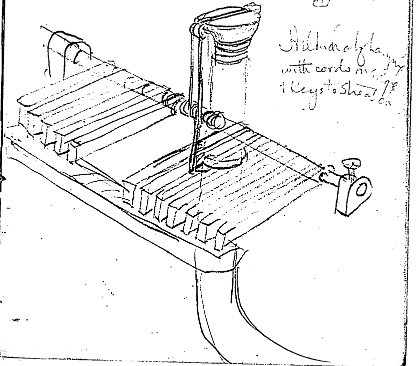
XE-172 N-86·04·03.1



April 3 1886 TAE

Larynxial Piano





Artificial Larynx
with cords m[illegible]
& keys to stretch [illegible]

April 3 1886 TAE

In the Gelatanous Silicon for Compound Carbons, mix ~~=~~ minimum Caustic K to cause it melt partially at highest temperature to hold Silica Oxide together,

Lampblack —

drop on hot plate (red hot to ignite it).
Petroleum, Crude & Kerosene,
Cylinder [illegible]

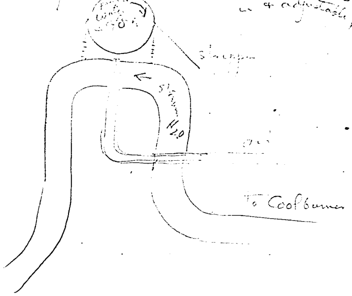
With natural gas - dextrose outside O but mix smallest quantity with gas that will give suf heat for decompsition

HO. HC

OO

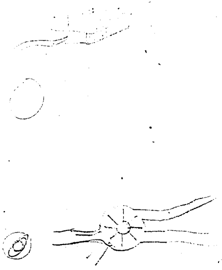
April 3 1886 TAE

Lampblack



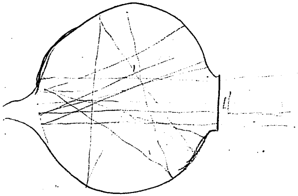
April 3 1886 7 a.m.

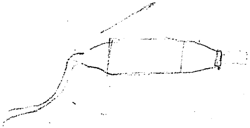
Clatterpler



April 4 1886 TAE -

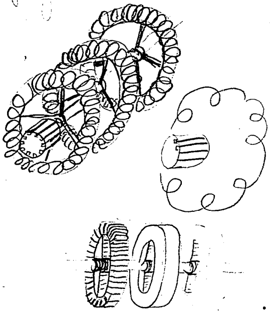
I propose to rotate the cotton picker spindles by a blast of air - acting on a wheel like Sturtevant blower, the direction being reversable as the spindle goes up or down towards the plant





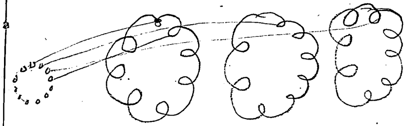
April 4 1886 TAE

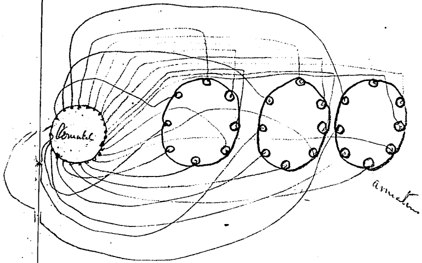
Nonspkg multiple armature



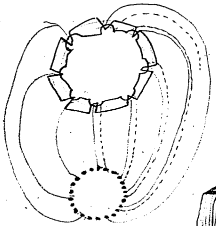
April 4 1886 TAE

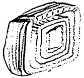
Multiple Gramme Armatures
non-sparking armature —





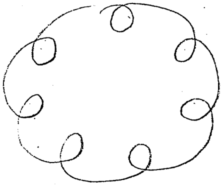
April 4 1886 TAE

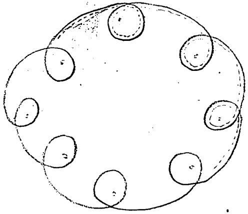




3 Sets gramme wound armature Coils in one armature,

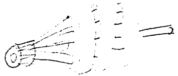
non-spkg -





Ht April 4 1886 TAE

Triple gramme armatures on one shaft with one field but



with one Commutator, the 3 coils in line on the 3 armatures Connected to 1 2 & 3rd strip in Commutator as in my non-spkg non-local coil shortening Siemens winding - See p 13-

Put this -

April 4 1886 TAE -

On the filament of Carbon coated with Silica etc The thickened Ends can be freed from the Coating by immersing in an acid Hydrofluoric, sulphuric etc, but this need not be originally coated if each one done by hand seperately.

The increase in the number of candles per hp with a white irradiating surface will probably be 10 @ 15 per cent,

---

Make a $\frac{1}{10}$ mf Condenser paraffine in form cylinder & Enclose in Vacuum - also one Exactly same Capacity outside & see ~~which~~ if Vac increases sharpness or Cap of Condenser

April 5 1886 TAE

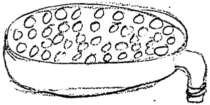
Carbonize less dense material
such as paper, wood - (pine willow etc)
Licorice mixed with MgO by auto
preliminary to get high resistance
then ~~if stands~~ well Compound
~~with MgO~~ surface —
I think with ~~perfect~~ Carbon
The lighter materials will answer
fully as well as bamboo & be
Exceedingly high resistance,
Try parchmentized paper,
While Holly -
Lampblack & Licorice MgO
" Tar MgO
Licorice MgO
punch out of rolled sheets
of this material -

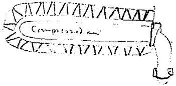
April 5th - 1886 TAE

Mixtures for filaments which are soft can probably be rolled down between tin foil several layers of material + foil one over the other + rolled together thus obtained Even;
Several might be clamped out simultaneously bent in loop + Carbonized together. The foil melting or could be eat out with acid - Thus making it Easy to handle filaments

April 5 1886 TAE

Caprice





April 5 1886 TAE

With ~~Auto~~ prelim - Soak original filaments with ~~Car~~ Licorice, prelim + Carbz reg - then soak Licorice + prelim + resoak two or 3 times then Carbonize regular This has never been properly tried, April 6th 1886

Tar -

Arc Light Carbons - before baking make sheets of pottery mixtures and roll outside covering on Carbon, - make mixtures so as ~~sp~~ Contraction will be the same, put it on very thin, perhaps 2 or 3 exceedingly thin 1/1000 Coats best,

Alumina - Magnesia, clays etc.

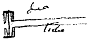
Grasshopper battery - make the size of the Cells as small as possible so as to prevent slow discharge by surface. ~~Cu~~ Iridosmine points so there is no fine metal points to follow + prevent instantaneous discharge

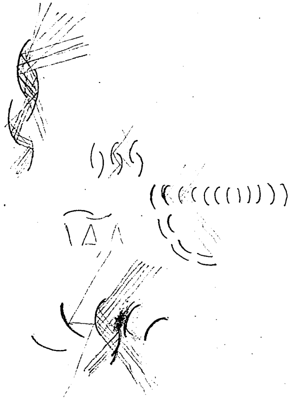
April 6 1886 TAE

Lamp

Make a mouse mill like Thompsons recorder or perhaps the Gas Lighter Morse mill run by motor will answer, use this in Static Experiments on Lamps for Counter charges—

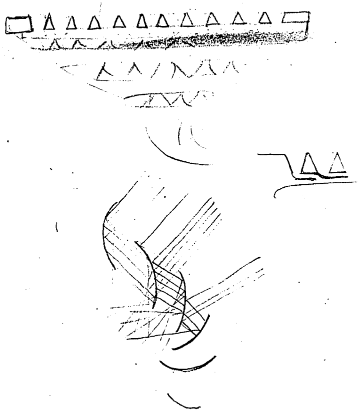
Speaking tube - Try greatest distance with inch gas pipe diaphragm on ends and 35 lbs to square in pressure inside you can speak — Try lead pipe instead $\frac{1}{4}$ inch inside bore —
Try at different pressures if increasing pressure causes greater distance/ Carry pressure up to 100 lbs or more to square inch. Try glass Tubing but on + Sealing wax poured on joint!

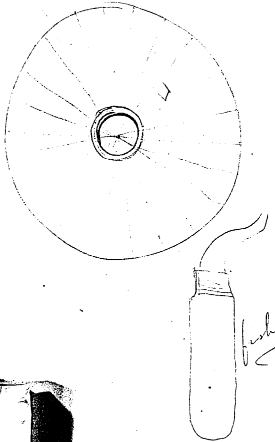




April 6 1886 TAE —

Draf —

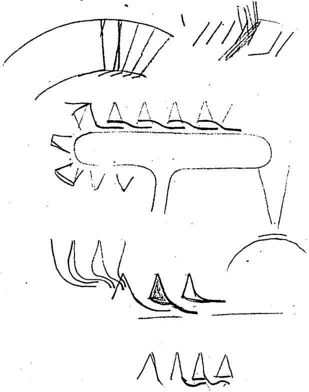




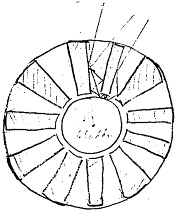
fishbladder

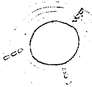
April 6 1886 TAE

Draf

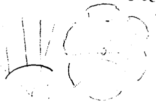


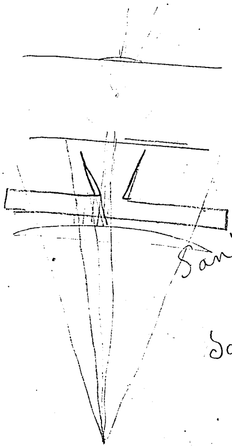
April 1 1888 TAE





30 mesh Sieve around fish bladder with Compressed air + Ear piece.

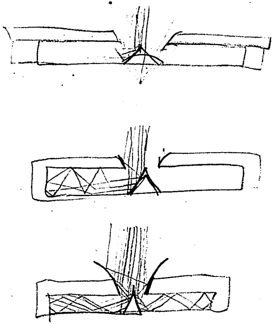


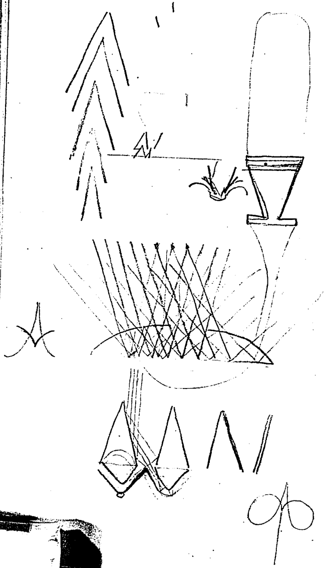


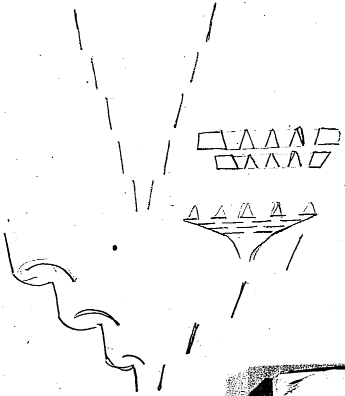
Sanibel
e
Sanibel

Aprile 1986 [illegible]

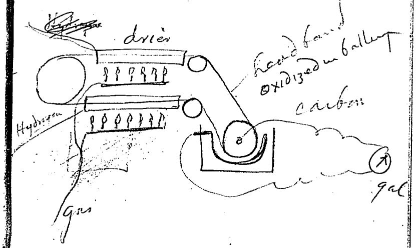
Telephone —





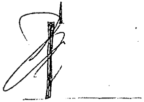


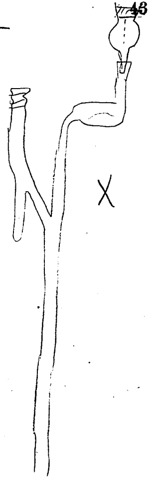
April 6 1886 TAE

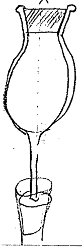


Conversion of heat into E by oxdtn & reduction of O of Lead on Continuously moving band of lead, passing into liquid Close to Carbon in proper liquid, Lead is Oxidized - thence through drier, tube thence through Hydrogen reduction tube to battery again & so on Continuously

April 6 1886 TAE



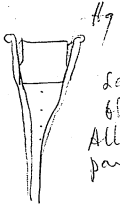




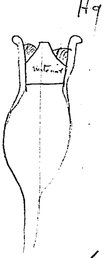
Experiments to get a porous material whose pores will let O through & not N

april 6 1886 TAE

Use plaster paris - dry clay
Cork - Lime - natural - moueded oxide phosphates Etc,
Meerschum - pressed
Chalk every deg pressure,
Cocoanut charcoal -
dif charcoal -



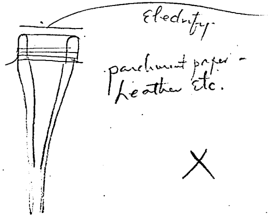
Leather
bladder
Alligator leather.
parchment paper



Electrify the surface of the porous material.

X

April 6 1886.



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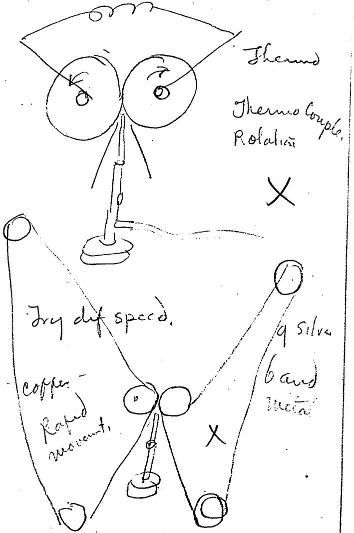
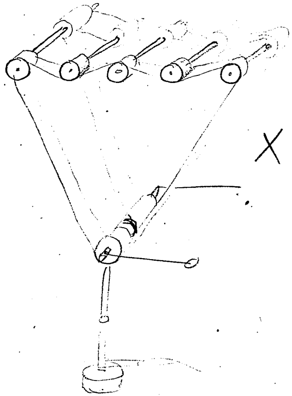

Thermo Couple,
Rotation
Try dif speed.
copper
Rapid movement.

apulleisslefag
Thermo



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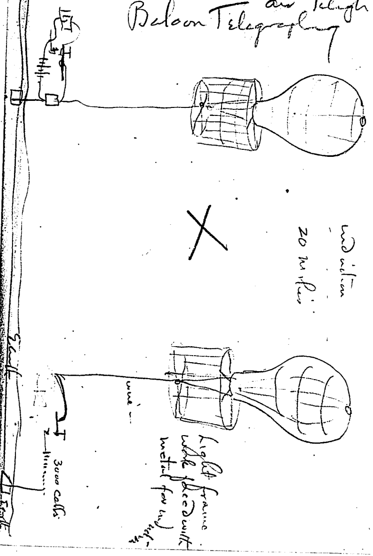

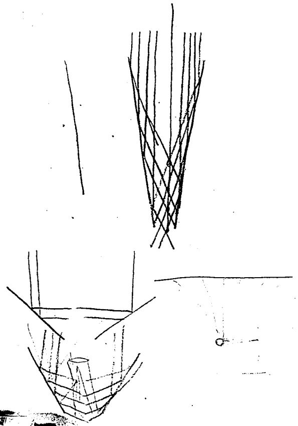

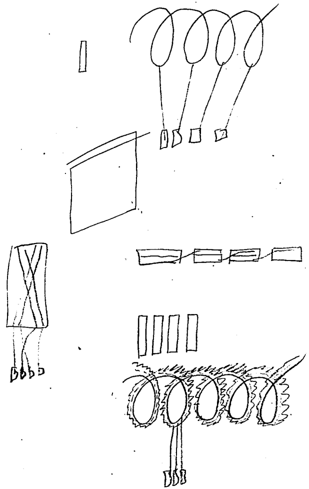

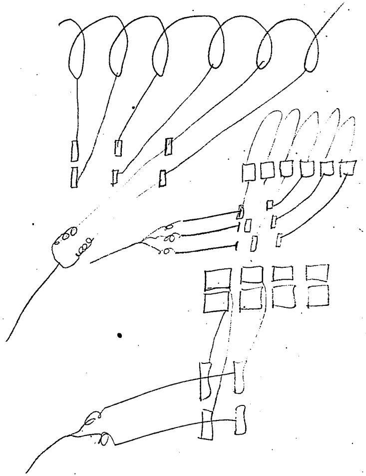

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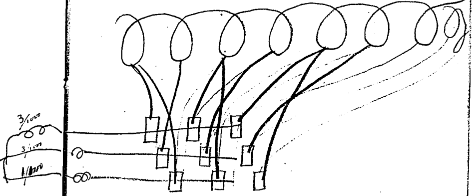
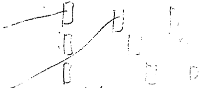
$\frac{2}{10,000}$





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$$\begin{array}{r} 176. \\ 140 \\ \hline 7040 \\ 176 \\ \hline 24,640 \end{array}$$

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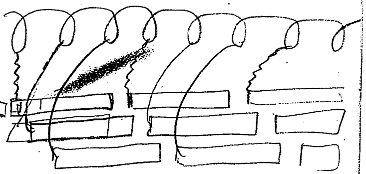
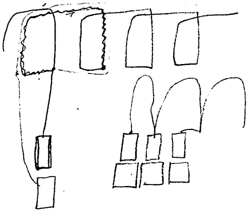
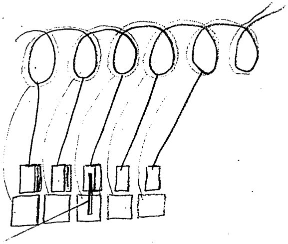
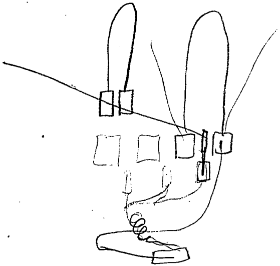
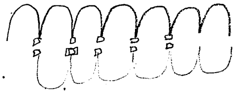
$$\begin{array}{r} 176. \\ 5000 \\ \hline 880,000 \end{array}$$

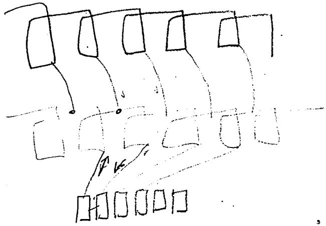


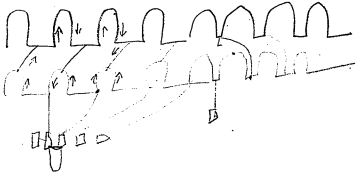


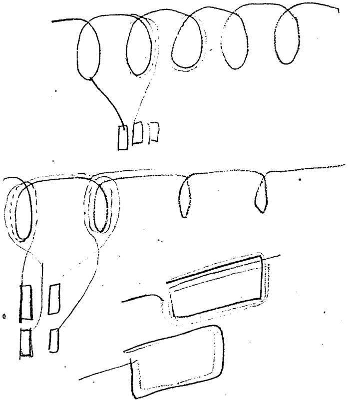


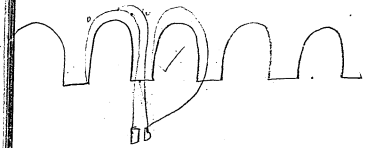


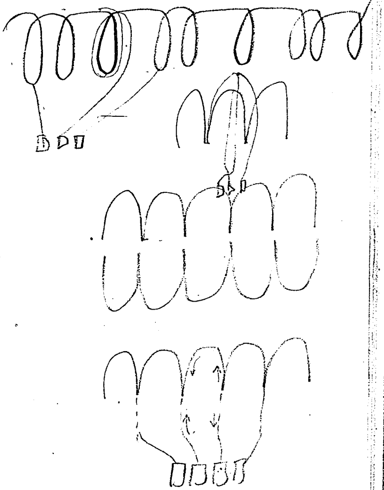


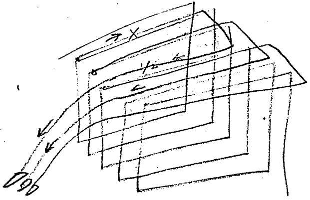


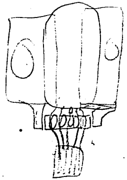


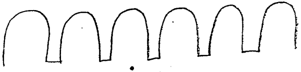


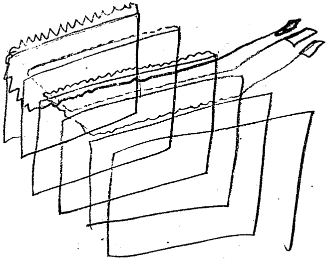


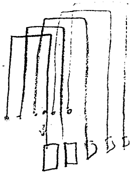


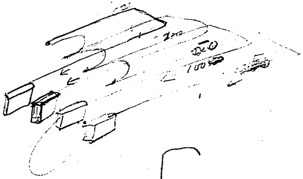


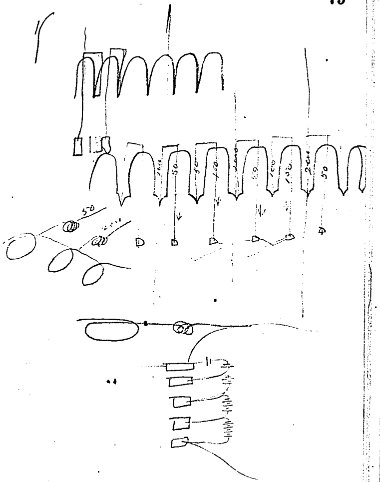


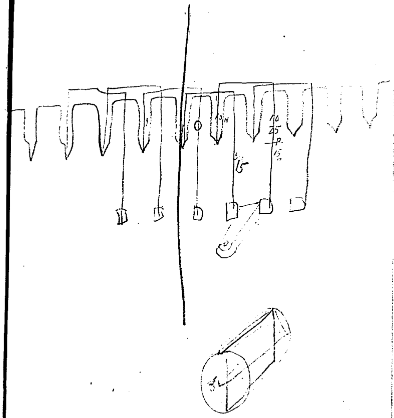


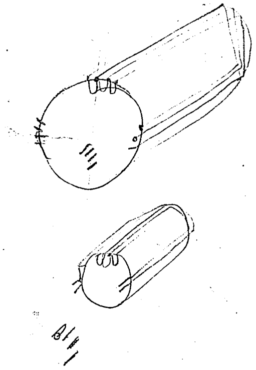


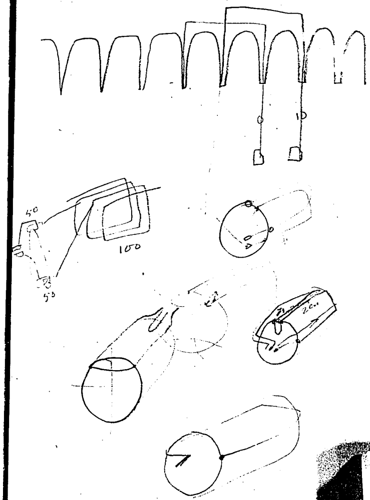








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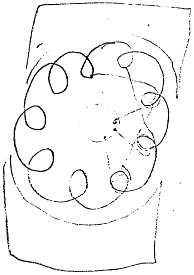

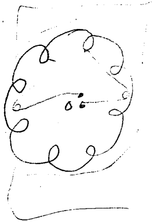

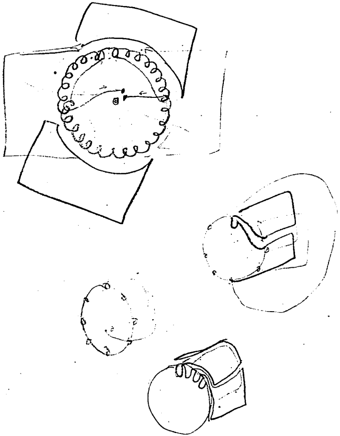

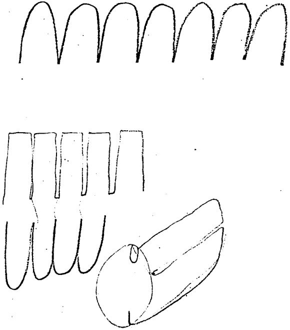

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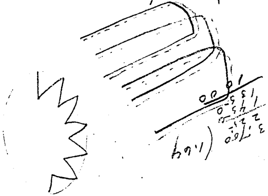

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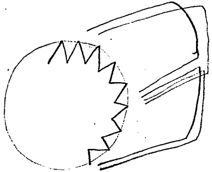

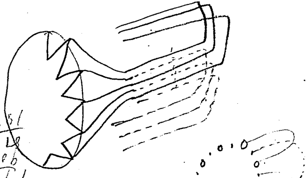

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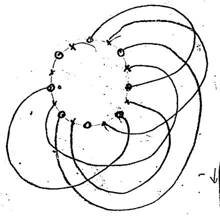

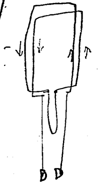

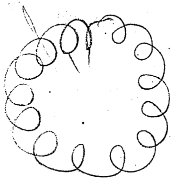

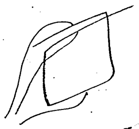

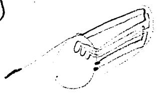

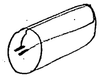

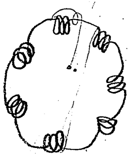

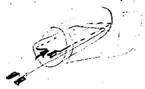

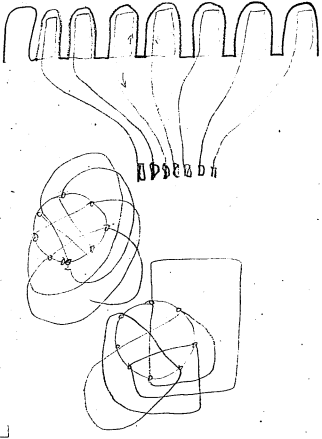

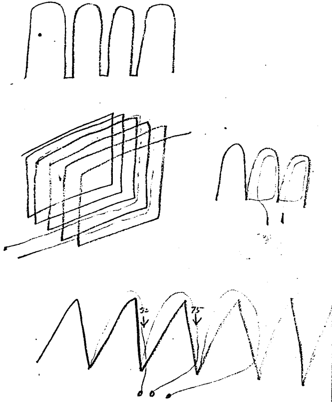
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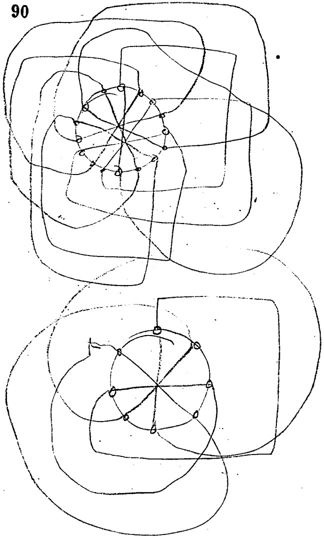

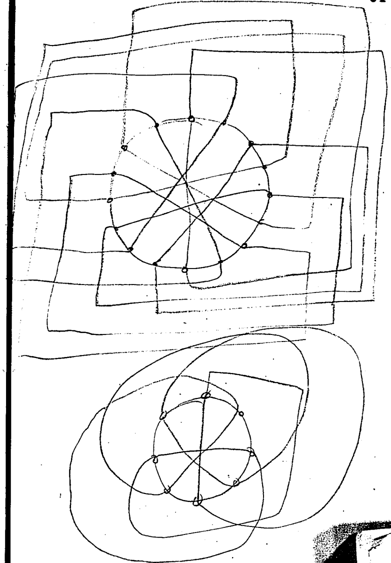

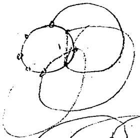

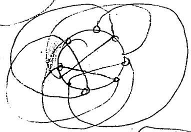

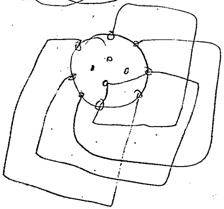

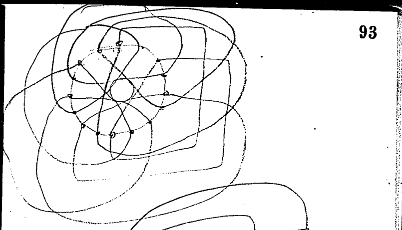

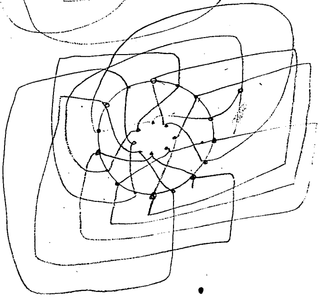

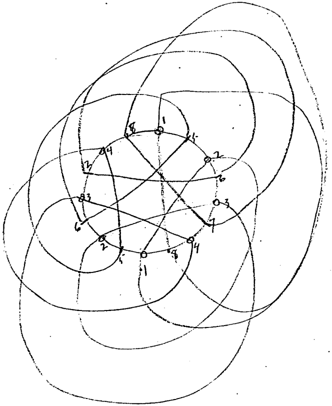

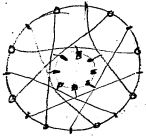

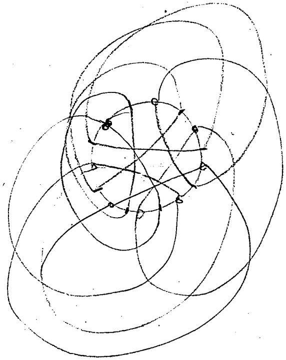

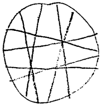

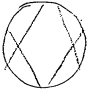

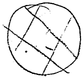

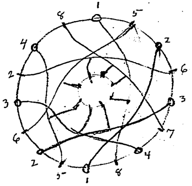
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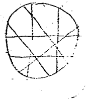

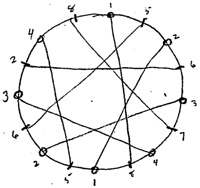
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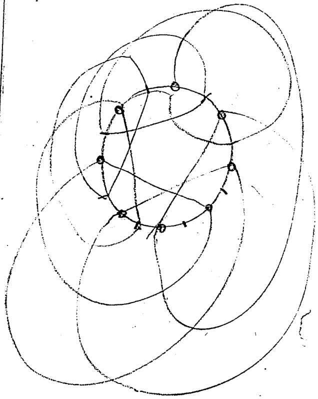

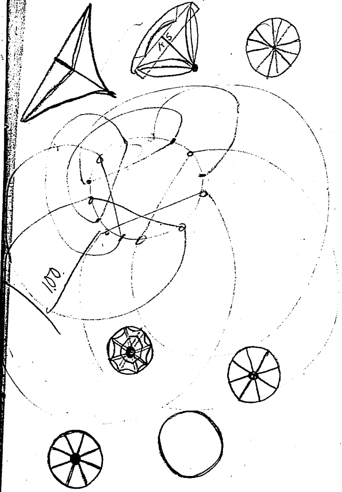
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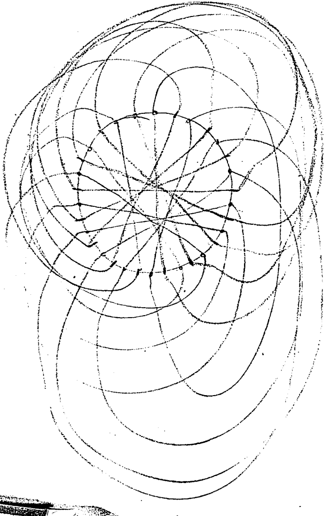

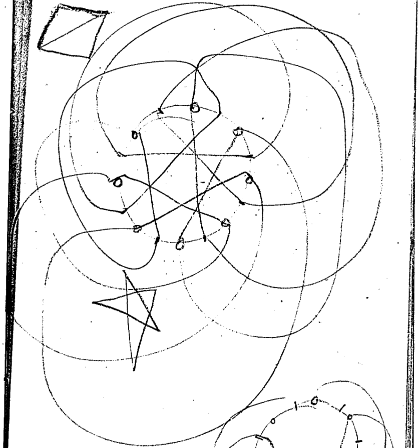

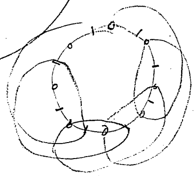

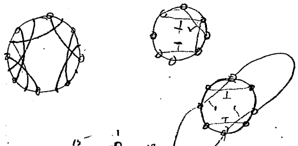

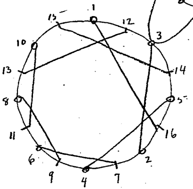
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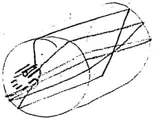

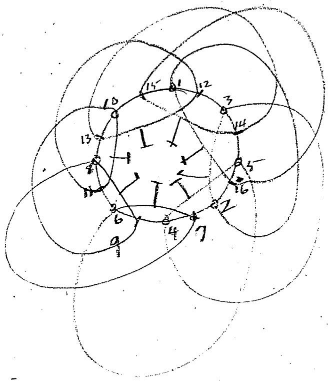
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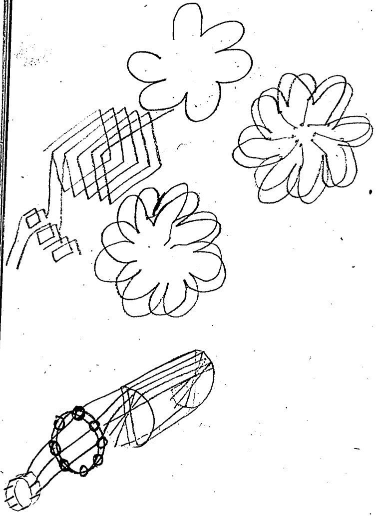

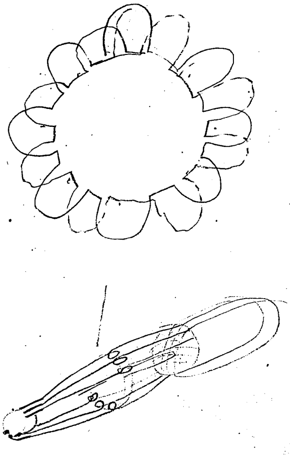

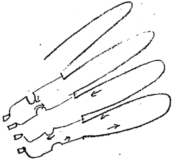

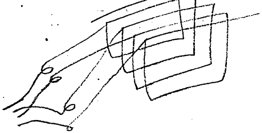

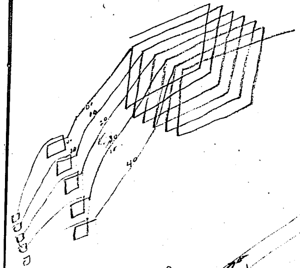
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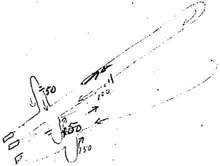
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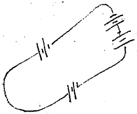

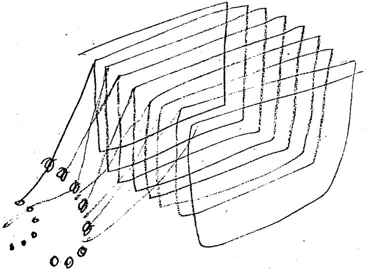

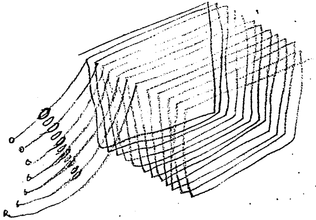

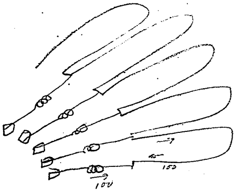

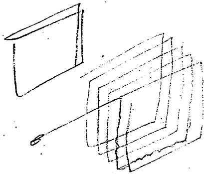

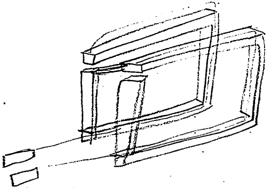

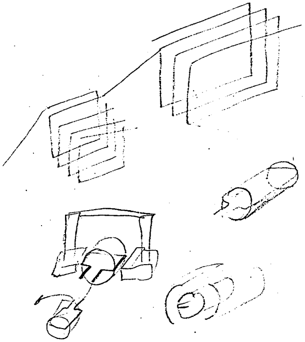

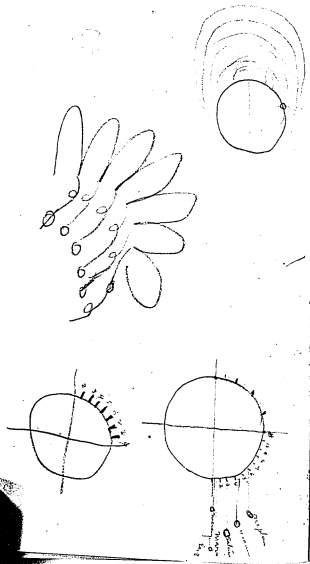

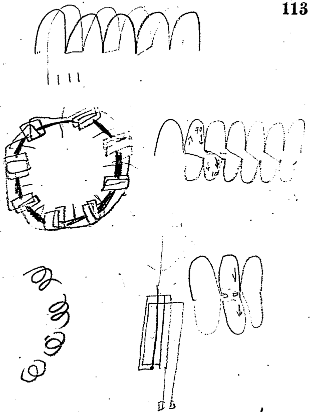

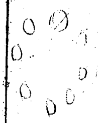

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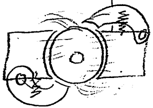

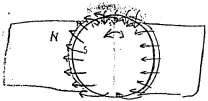
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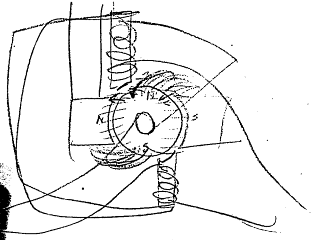
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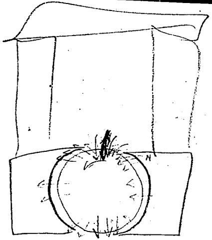
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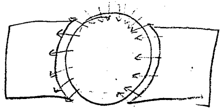
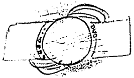
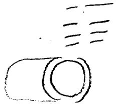
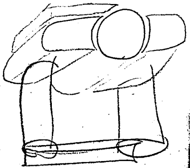


revelations were made today
Concerning the mysterious
disappearance of Grace Whitcomb
postmaster ~~Mr~~ General Vilas's
niece from her home in Jackson
Mich - The family have
from the ~~x~~ first asserted,



That it was unlikely that she had
left Jackson but this evening
it was learned that grace
took from ~~her~~ home

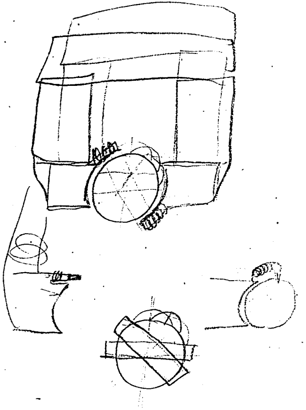


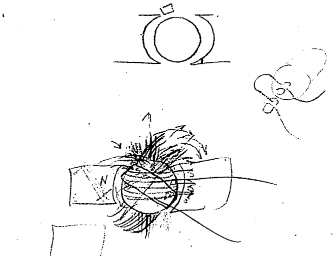


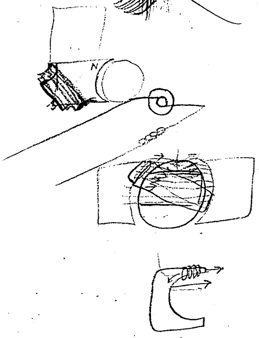
mr John Gould of this city has at the request of a number of business firms ~~in~~ drawn up a petition to the legislature asking for the amendment of the present assignment laws with a view to prohibiting preferences.
s

The suit of rosahode [illegible] dom st ic gainst rch o not s mun er

why was the case so suddenly dropped after the long drawn out litigation







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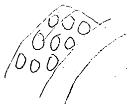
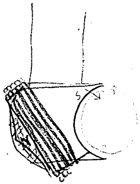
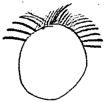
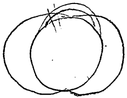


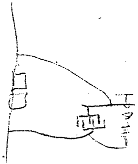






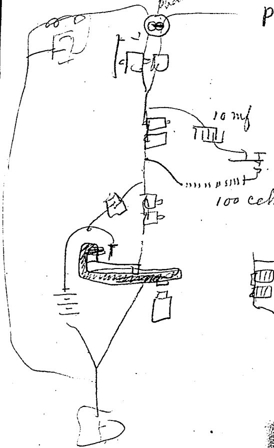
...icago. William Weste negro minstrel appeared in judges shepherd's house to day and proceeded to tell all about his troubles with his wife Fay Templetan. from whom he sought a devorce. I madried my wife said he in Nashville May tenth miss Templetan was then a dramatic artist but before I would consent to marry her I exacted the promise that she leave the stage. We lived in Nashville one week when my minstrel company came back north and my wife rejoined me in New York about June fifteenth and renounced her position in her father's compan

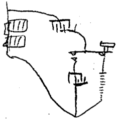
When we reached chicago we put up at the Tremont House. We had been here about two weeks when one evening, Mis West startled me by saying, well Billy I think I shall go back to New York. I asked her what the trouble was. Oh, said she, I dont think I can stay away from the stage. Married life is all well enough for a little while but you soon get tired of it. Well, said I, you feel that way go and God bless you. She went back to New York and resumed the stage. She is now playing in Rice's Evangeline company



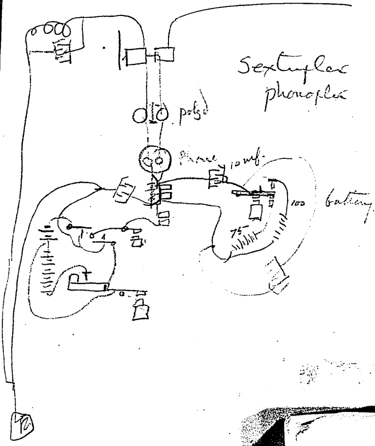
April 8 1886 TAE

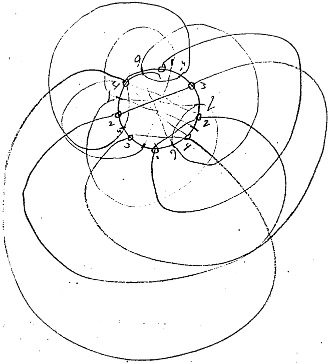
Quad phono-Duplex

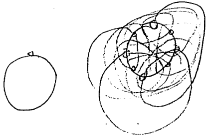


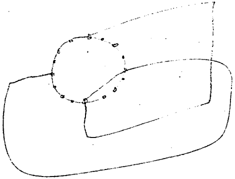


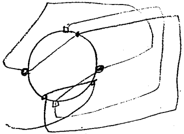
April 8 1886 TAE

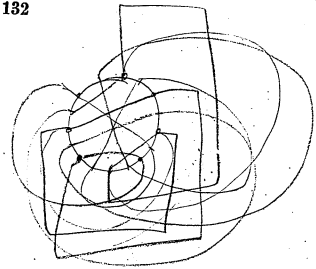


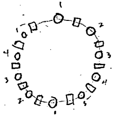


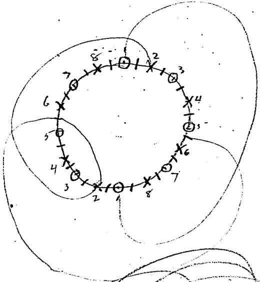


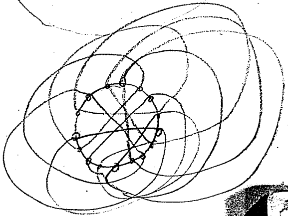


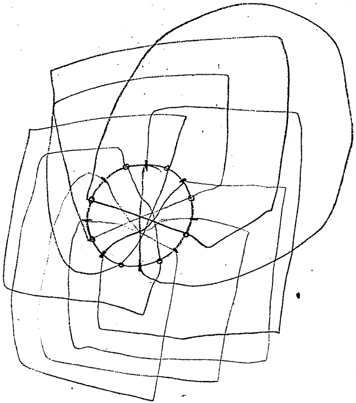


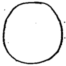


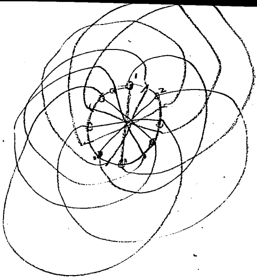


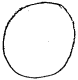


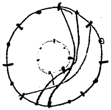


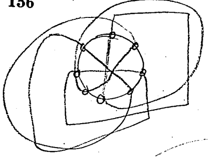


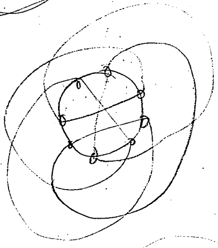


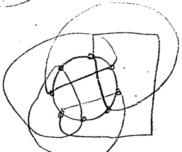


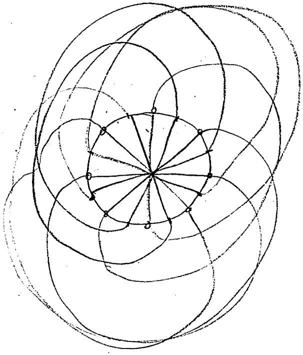


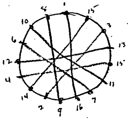








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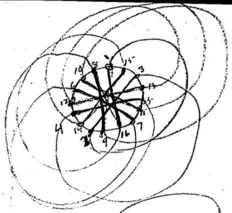
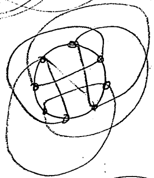
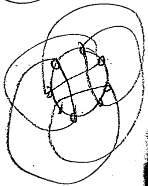






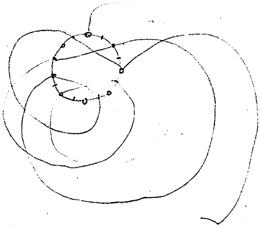
Washington, D

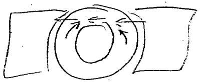
In the senate today Mr. Logan submitted the following resolution and asked that it might be printed and lie over. Saying that he would call it up on some future day and submit some remarks. Resolved that the senate sessions commonly known as executive sessions so far as they apply to nominations confirmations or rejections shall hereafter be held with open doors and the public record of the same be kept the same as of legislative sessions. Mr. Ingalls offered a resolution

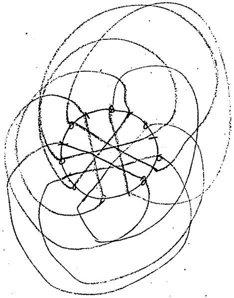
Calling on the postmaster general to inform the senate whether he had received a resolution of the senate passed on march fourth which asks the number of fourth class postmasters removed ~~since~~ since march fourth and if the resolution had been received why it had not been answered and when a response might be expected. Mr. Ingalls said ~~that~~ eighteen days had elapsed since the adoption of the resolution and as it ~~mad~~ merely called for the number of such postmasters and did

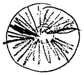
not call for the names
of or other particulars
of detail: it merely re
quired a computation
from the officiate regis
ters which he thought
might be done in two
or three days at the utmo
st. He had no ~~desir~~ desire
to assume that there was
any disinclination on
the part of the postmaster
general to comply with
the resolution but as
the information was
necessary in some
remarks that Mr. Ingalls
hoped to be able to sub
mit to the senate on the
resolutions reported from
the ~~judge~~ judiciary com

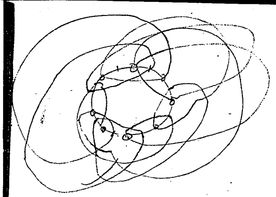
mittee and he ~~said~~ saw
no reason for the delay
he had offered the re
solution.

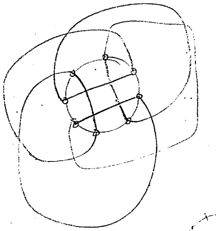


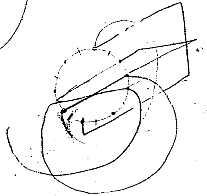


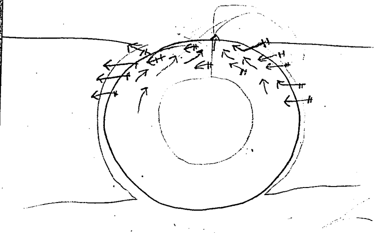


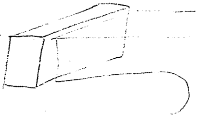


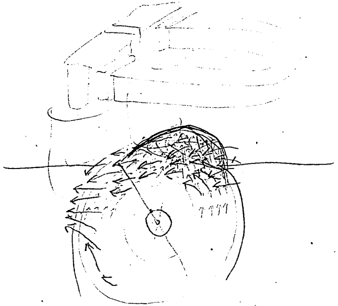


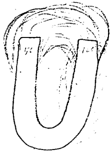


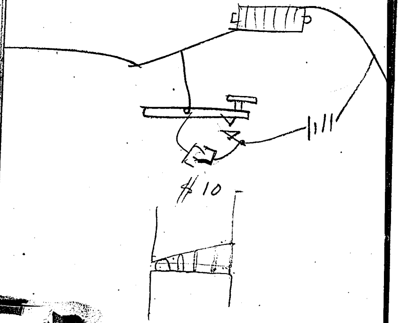








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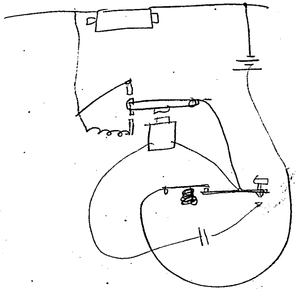
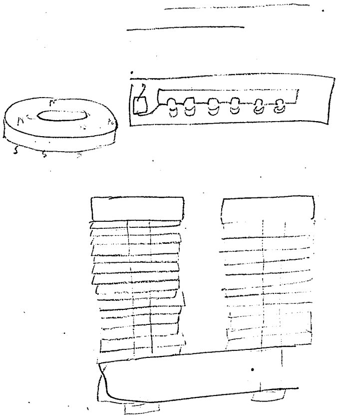
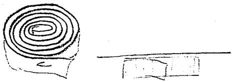
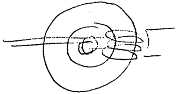
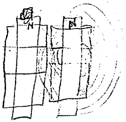
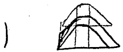


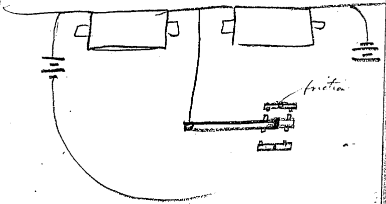


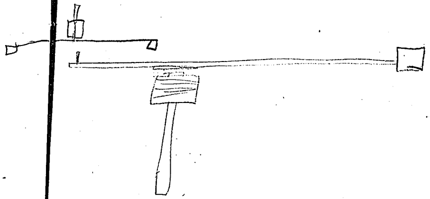


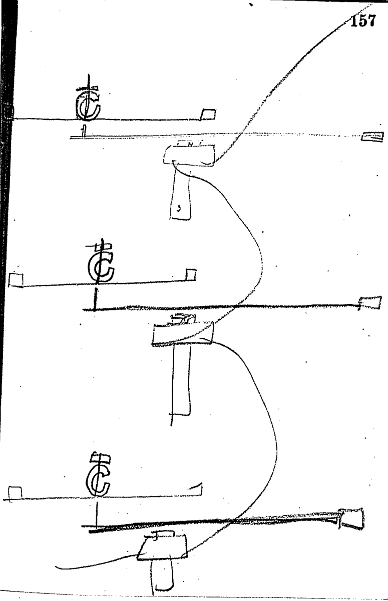


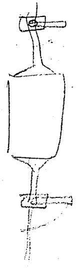


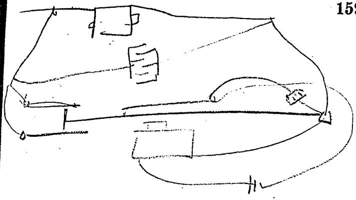


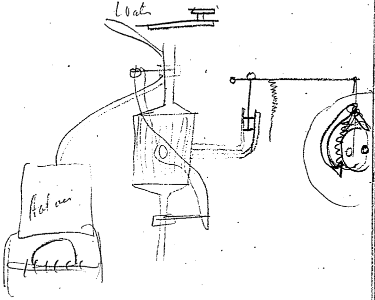

friction

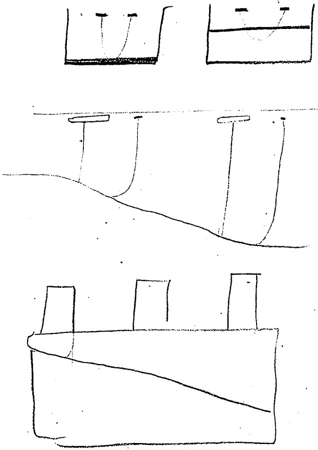










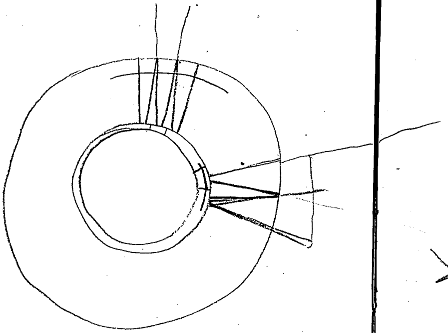


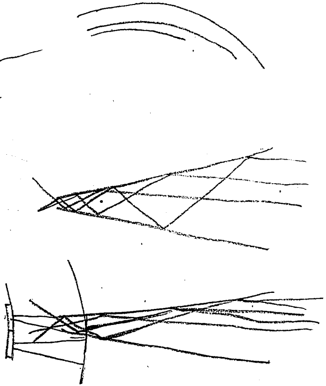
Little Phyllis a girl of five years very erratic was behaving in a particularly obstreperous manner the other evening. Not thing could induce her to calm down and be a good girl, finally her mother said now Phyllis I think there is nothing that will make you good except to say your prayer. I want you to come with me in to the library and kneel down and say your prayer and then I am ~~sue~~ sure you will be a better girl. She allowed herself to be led into the room

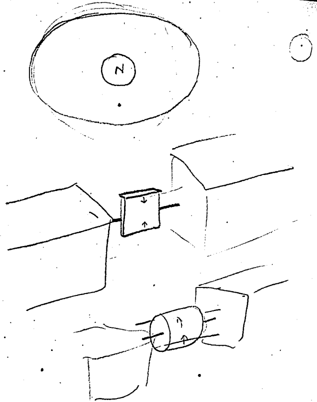
and shurely enough knelt calmly down and said her prayer with ~~sweetness~~ and humility closing it thus as usuall. Dear Lord, please bless my papa and ~~mama~~ My mamma bless me and make me a good girl, amen ~~amen~~ and then jumping up and stamping her foot violently. There mama you got left that time.

The ~~Kedev~~ Khedive shook hands and seated me on one side of the angle ~~g~~ made by the corner while he occupied a chair directly in front of me. ~~The~~ Thus placed the light from the wind ow fell upon him ~~m~~ and I had an opportunity of study ing the man who since he came into power has ~~p~~ from the force of circumstances been almost as fully in the blaze of notoriety as any europ[ean] monarch. I have already said that he was neatly dressed. His linen was of remark able whiteness suggesting that the rupture of the ~~dual capacity~~

Control had not prevented the retention of a French laundress. It may be a royal peculiarity to have clean linen but in this case the whiteness was exception ally. The Khedive has narr only escaped being handsome His hair is dark, his nose straight and not large



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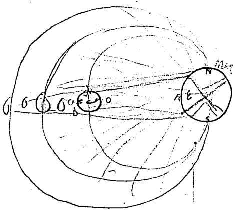
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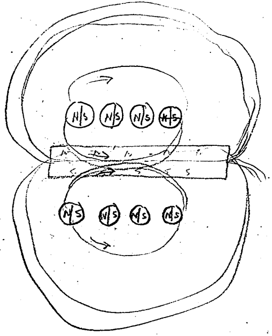
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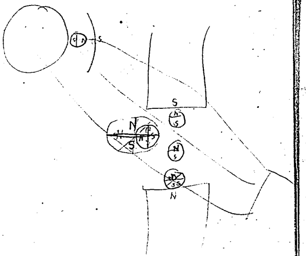
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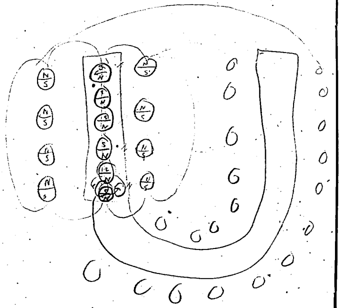
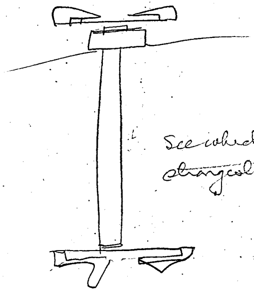
N
S
N



April 9 1886 TAE Copy

Telephone receiver



See which is strongest End

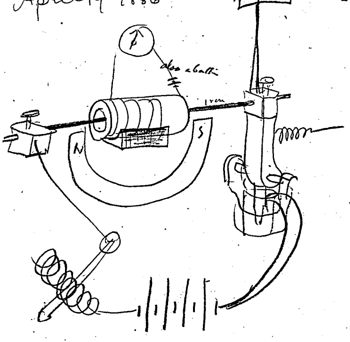
April 18 1886 TAE

X42

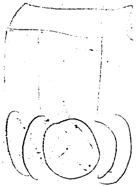
If Iron loses its peculiar property of magnetization at a red heat probably non magnetic metals may gain the property, hence Try all with Core & armature at all temperatures up to bright red —

Iron at a good point about dull red !!! say 900 fahr loses its magnetism hence by manipulating the temperature causing a slight rise & fall it will magnetize & demagnetise a field magnet and thus by winding an Extra low resistance Coil can be thrown in Current & Commutated thus getting heat into Electricity

April 19 1886 —



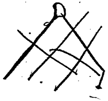
Experiment to bring iron up to 900 (re) the Critical point where it loses its magnetism & see if can get induced Currents.

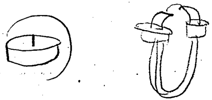


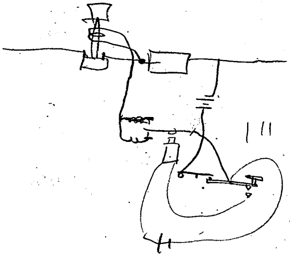
April 19 1886 -

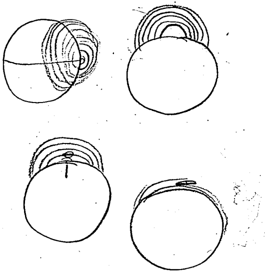
If Iron loses its magnetism slowly up to 900 fahr. then and change in heat of a magnet ought to throw induced Currents in a coil

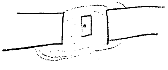
Therefor hot + cold water oscillated through magnet composed of thin tubes one within the other ought to be a way of getting heat into Electricity

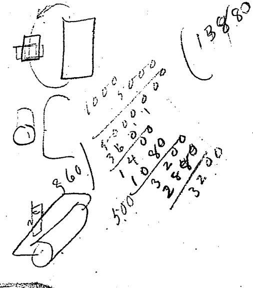


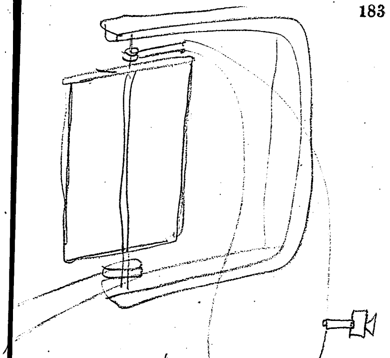


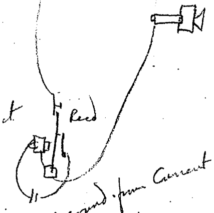




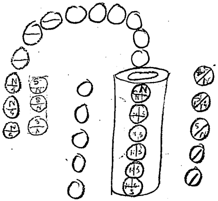


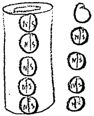


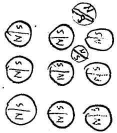


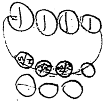


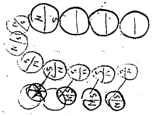
Cut the lines of
force of the
Earth & break it
up into ~~waves of~~
~~[illegible]~~ as waves
are too Gradual
Then ~~take~~ make same val sound. from Current
& Reed amperes.

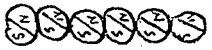


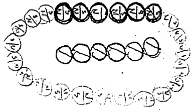


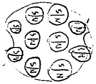


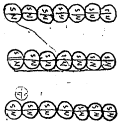




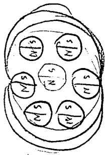


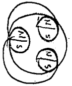


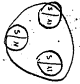




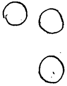
Sym

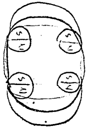






April 22 1





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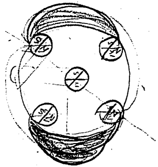

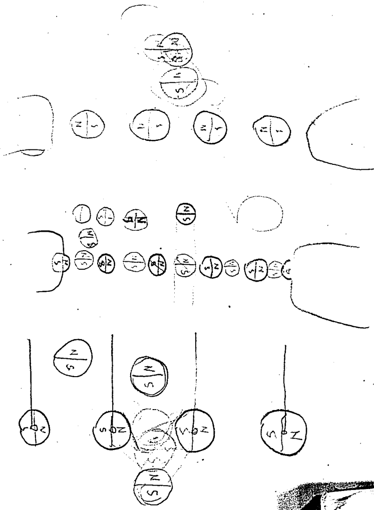

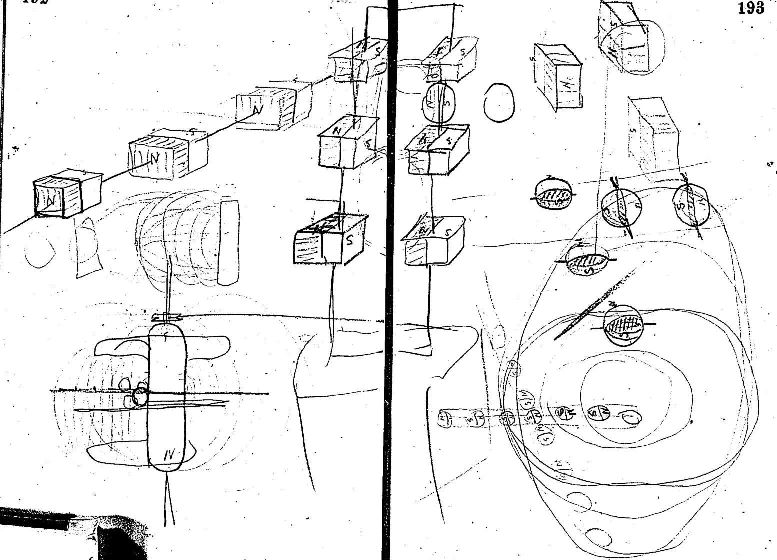

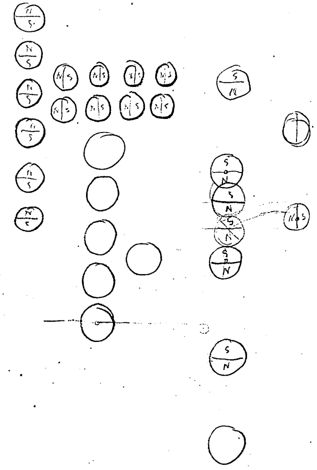

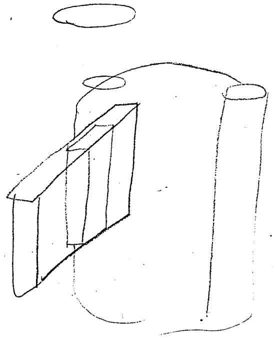

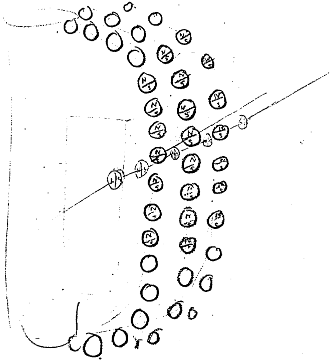

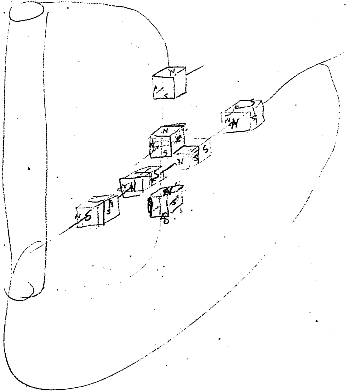

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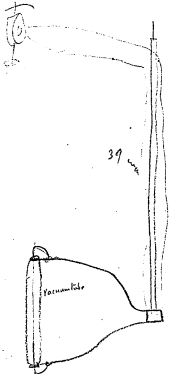
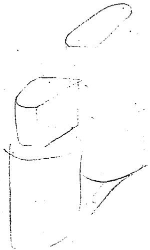
fundamental.



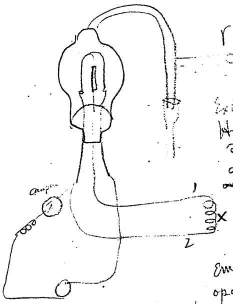


See if the EMF is
Exactly same in tube
without & with a very high
vacuum —

April 23 1886
TAE

Fundamental

Y Hydrogen



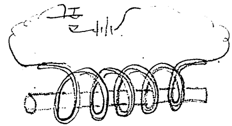
Exhaust fill with
H Exhaust & fill
several times, then
~~at atmospheric pres~~
~~or near there~~ with
ordinary Barometer
gauge, start
pump & take
Emf at 1 & 2 with X
open until pump
has run hour beyond
reading by ordinary gauge
Break Vac by letting in H & Connection
again make Curve with X closed
Say 500 ohms — close repeat at different
resistance Keep Current same (10) 20°C
at high Exhaustion —

OVE

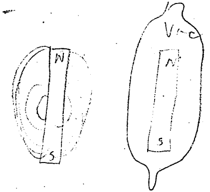
April 23 1886 TAE
also Keep Cp same. 20
during all exhaustions
+ run curves with
X open + closed –
also try dif gases

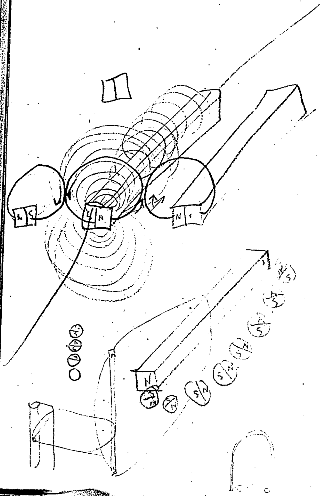
Try a platinum loop
+ Center plat wire —
also – Iron loop +
Center platinum wire
Use a regular lamp +
make two center wires
exactly alike in length +
size + platinize one
plat one 2 mo. see if difference

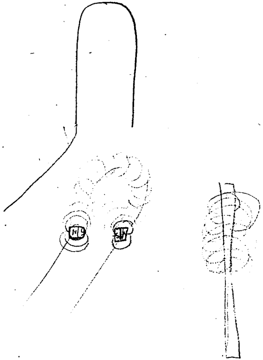
April 23 1886 TAE



glass tube with wire in 10 or fifteen turns, Vacuum in tube, see which is strongest with or without vacuum —







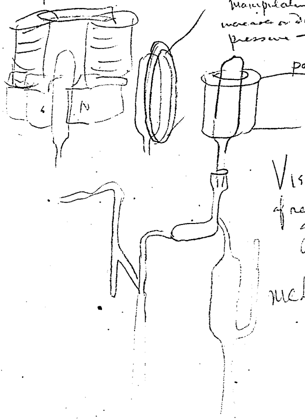
L of F seems to be
Lines of Force
GRS
3/22/54

? McL 9 could be
reading on McLeod Gauge.
GRS 3/22/54

April 23 1886

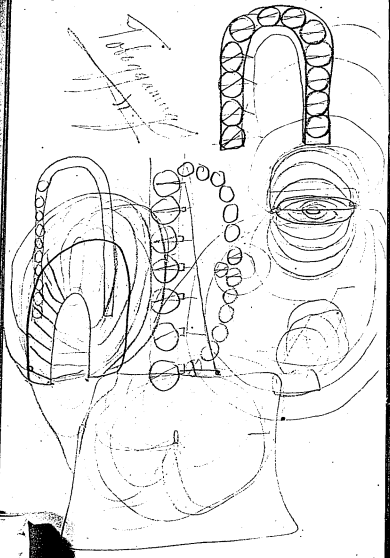
Fundamental

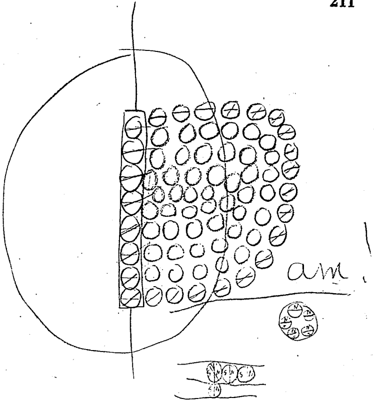
Ascertain if
with a given vacuum
manipulating L of F
increase or diminishes
pressure —



Viscosity
of residual
gas

McL 9

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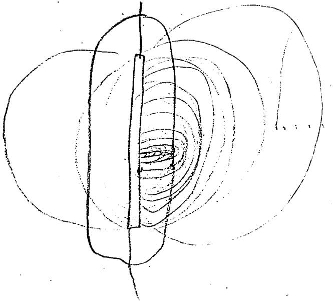
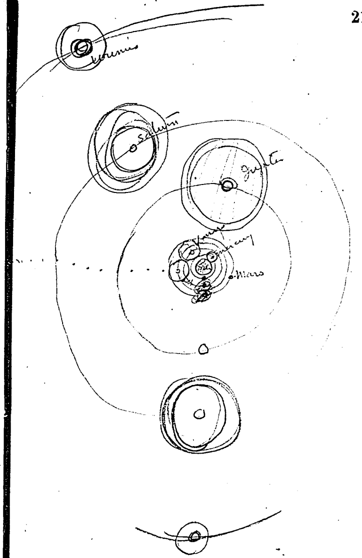



Uranus
Saturn
Jupiter
Mars

983.000

93000) 3,932,000,000 (4
3,600,000

7896.

1000 –

950,000 !

1	4
2	16
4	64
8	256
16	1024

16
32
32
48
512

2	4
4	16
8	64

16 · 16
96

16 · 64
64
96
1024

93000.
983,000

1000

365) 10759 (29
730
3459
3285

600) 6000

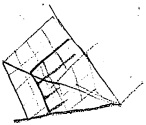
365 – 100 m.

Saturn 100 times ~~nothing~~
87 times more mass
29 times longer to make circuit.
10 times further to go –

75
75
375

64) 5625 (87.
512
503

365) 666 (1.8
365
3210
2920
290



15
15
75
15
225

1300 (1.44
900
1000

558) 904 (1.62
558
3460
3348
1120

93
46
139
278
904

64 / 1000 15.6

1000
250
62.50
15.36

256 64 16 4 0

.250
.0625

512
1044
4176
16704

11 / 1000 (9.9

100

40
40

95
95
465
855
9074

95
95
465

90 / 1000 (11
90
100

6282

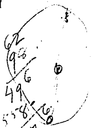
5) 7500

9.38

7800
78
624
546
6081

75
75
375
525
5625

62
98
9338



75070
75070
549
37535
49
5635

62.226.816)

62 / 558
496

62
98
496
558
6076

Saturn 9.5 farther

99 ~~times~~ weaker

90.56 larger in bulk.

9.5 greater diameter

9.5 greater distance around the orbit

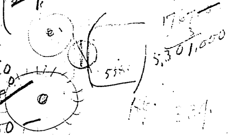
29.4 times longer going round.

3 times longer going ~~[illegible]~~ equal distance as the earth

9.5) 29.4 (3.
285
90

365) 10759 (29.4
730
3459
3295
1640
1460

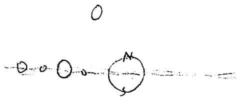
558,000



1767
3
5,301,000

558) 5301 (9
5022
2790

93
558
88
558
1767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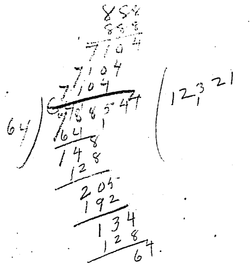
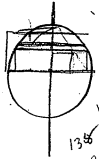


87) 365 (4.2
348
170
174

880
440
138,000



93
186
3358
5552

138
3089) 7896 (2.3
6178
17180
15445

138,000

7896
7896
47376
71064
631
55272
61347

3089
3089
27801
247
9267
954202

9896
31584
3089
12356

9542021) 61346826 (6.4
57252126
40947000
38168084

See p 257

Mercury

1/4 distance
4 less length of orbit
4.1 less time going around
6.54 less bulk
2 ½ times less diameter.
Lines of force 4 times stronger

Bulk earth 61,346 000

$$4070\overline{)7596}(1.94$$

4070
3526 0
3 6630
16,300
4070
4070
3549 00
16280
1.96

·3

2/93
46.6
1.39.

·46

1000
3
3000

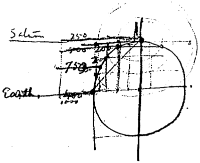
4000

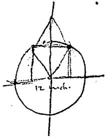
1500
3

3.7

61346000
49494700
11652700
12059300

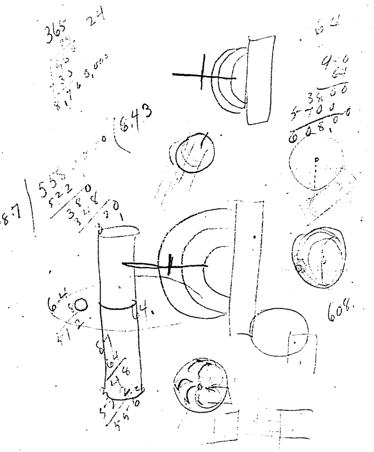
Mars. 3.7 the bulk
1.94 the diameter
2.25 less strength of gravity
1.52 longer orbit
1.88 times longer year





4.

36



surface velocity
Movement of Earth on axis 64 times less than around orbit.

Saturn

L of F 99 times weaker
90.56 larger in bulk
9.5 greater dia
9.5 greater distance around orbit
29.4 longer going around the orbit.
or 3 times slower than earth over a given or same distance.

Mercury

L of F 4 times stronger,
1/4 the distance
1/4 The length of orbit
4.1 times less time going around orbit
2.5 less diameter
6.54 less bulk

Mars

L of F 2.25 weaker
1.52 the distance
1.94 the diameter
1.62 longer orbit
1.88 times longer going round
3.7 the bulk

Uranus

84 times ~~slower~~ in making its circuit
19 times greater length of orbit or 4.46 times slower
~~21.036~~ 21.036 times greater bulk
4.54 times the diameter
~~19~~
44

19
450
950
76
85,550

449
19
4041
449
8531

93
19
837
93
1767.000

447
19
4023
447
8493

62,346 000

c

1

m

1783.
2
3,566.000 000
3
(19

550.000 / 10.6 9.8 000 000 (19
550
5198
4950

550
19
4950
550
10,450

365 / 30686. (84
2920
1486
1460
84

306

2790,000,000
2
5580,000,000
3
16740000000

9

93
30

930000000
30
2790000000

30
30
900

111) 1000 (111

111) 10000 (999

111) 100000 (99

19
19
171
19
361

10100
999

277) 1000 (360.

111) 100000

4

30) 164 (5.46
150
140
120
200
180

550,000) 1674 000 0000 (304
1650 000
24 000 00
22 000 00
2 000 000
1 650 000
350 000
...

365) 60126 (164
365
2362
2190
1726
1460

36436 / 550 000

~~Stumfid ss~~
disappearance
Successful politicially
drawing Significant
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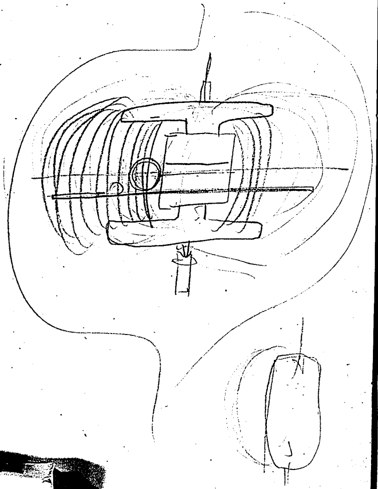
recently multitude
intersting
brocklyn
~~Authorities~~
Asthorities
received
requesting
washington
decided
Sataday
Stampied
including
portraits

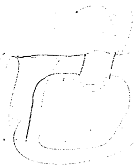
What time dome have
supper
You are lies e t
the

how fa i

How far is from new
york to Liverpool
Did you go to Europe
on the Alaska
Did you visit Rome
Would you like to go
to ~~[illegible]~~ Japan
Did you ever look throu
a telescope

from new York ~~tel edison~~ to ~~Tel~~ Edison.
For ~~Ut~~ Myers —
Deutsche Edison
gesellschaft Berlin
ask for me to get you
to arbitrate between
them and Siemens
and halske in dispute
about arc light I think
You may accept sign-
Ed Bergmann —





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4
700) 408000
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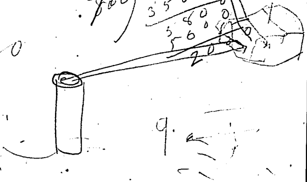
2000
(582

200

80.



9.

335
2
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582
365
2910
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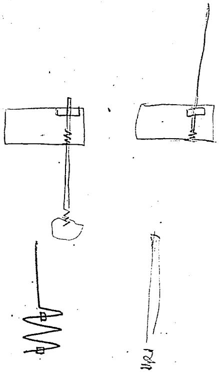
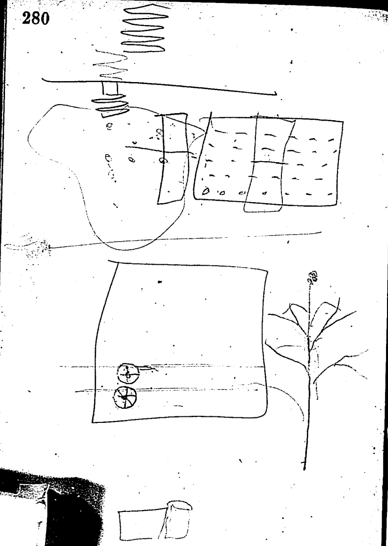
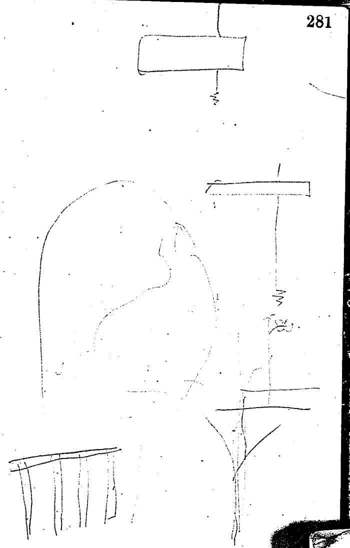
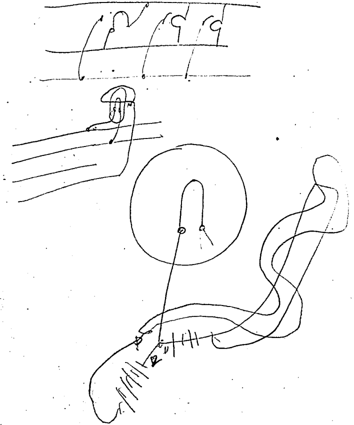
1746
212438
21244
18994

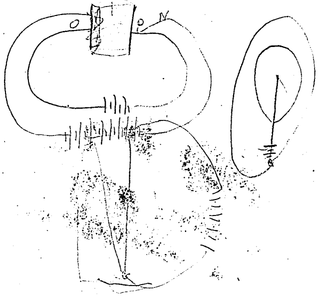
19







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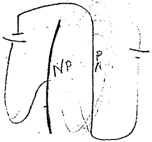

NP
P

Fort Myers Notebook, N-86-04-03.2

This notebook dates from April 1886. The few entries are by Edison and concern the speed of the earth around the sun and the design of quadruplex and phonoplex telegraphs. The first page contains the notation: "Present By T.A. Edison Apr 3rd 1886 Ft. Myers." There are 286 numbered pages.

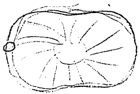
Blank pages not filmed: 2-3, 18-286.

N-86-04-03.2

×E-5286

Present By T. A. Edison
Apr 3rd 1886

H. Myers.



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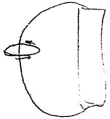
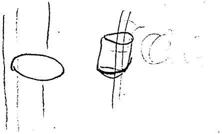


18.4
60
~~11040~~
1104
60
66240

~~66240~~ | 4536 | 66240 | 14.6

45360
20880
18144
27360
27216

Earth goes 14.6 times as fast as the sun.



65
7
7 455

1500. at 4.

3/8.
9

7 / 5250
750
7
350
750
350
7 / 225
32

37500

95

5 wires alt 1/8 dia. 50 miles long
2 feet apart, 24 feet from
Earth,
deadground each end except
relays —

3/8 surface about of 3 feet for mile
or 36 ft sqr foot. hence 5 wires
7 feet to square foot, 750.
square feet to mile, 37500
sqr feet 50 miles,

500 sqr feet to Car 3 Cars
1500 square feet.
distance to wires 40 feet.
Cars 195 feet long use say 225
feet wire, 7 feet to foot, is
32 Sqr feet opposed to 1500 Roof

1500 | 37500 (25
3000
7500
7500

32 sqr feet.

32 at	40
16	20
8	10
4	60 [illegible]
2	30
1	15
72 sq in	~~16~~ 62 1/8
31 "	31, 1/8
16 "	16.
8	8
4	4
2	2
1 1/2 1/4	1 1/16 1/8

1/4

23 times the W

"

1/16

32.
4
128

2' inches 1 ohm

128 inches 1 ohm

~~4~~
16
64
256

128 inches
256
512
1024
2048

1 ohm

Washing

128 | 3000, (23.
2560
4400
384
56.

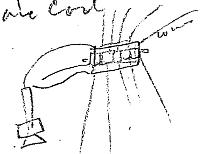
Wires 25 times the surface,
Volts of 1 ohm coil say 500 Volts
600 ohm coil has 28 times the
quantity of volts. 600 times
less quantity

Use an air condenser for receiving
from the wire, the said signals to
failed to go through air conds
owing to its rapid charge &
discharge,

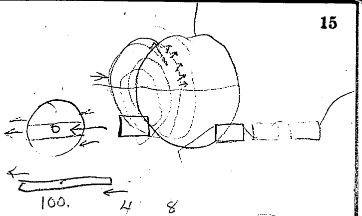
Expmts to be tried -

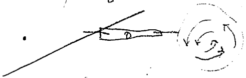
Cord on freight trains

Receiver right in ckt, 5 separate
spools on phone -
also Induction Coil, 5 ohm
primary, + 50 ohm Secondary
all in one cord

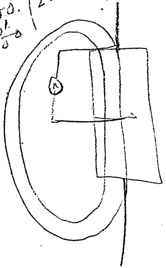


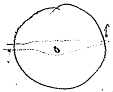
See p 11

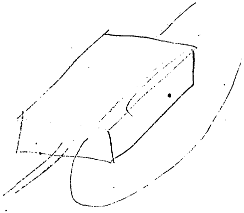


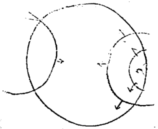


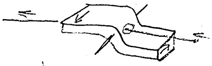
1500) 37500. (25
3000
7500

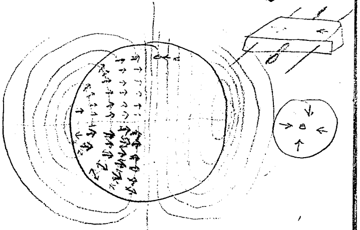


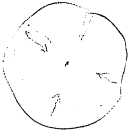












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